DOCUMENT RESUME

ED 066 558 VT 016 023

AUTHOR	Greenberg, David H.
TITLE	Income Guarantees and the Working Poor in New York City: The Effect of Income Maintenance Programs on the Hours of Work of Male Family Heads.
INSTITUTION	New York City Rand Inst., N.Y.
SPONS AGENCY	New York City Board of Education, Brooklyn, N.Y. Div. of Funded Programs.
REPORT NO	R-658-NYC
PUB DATE	Mar 71
NOTE	114p.
AVAILABLE FROM	The Rand Corporation, Publications Department, 1700 Main Street, Santa Monica, California 90406 ($4.00)
EDRS PRICE	MF-$0.65 HC-$6.58
DESCRIPTORS	Family Income; *Guaranteed Income; *Heads of Households; Labor Force; Labor Supply; *Males; Poverty Programs; Poverty Research; Program Costs; Tables (Data); *Welfare; Welfare Recipients; *Working Hours
IDENTIFIERS	Negative Income Tax; New York City

ABSTRACT

The Family Assistance Plan and the President's Commission on Income Maintenance Programs are both proposals which incorporate a negative income tax provision and which are aimed at reforming the present welfare system. This study is concerned with the effect these proposed income supplements will have on work decisions of male heads of families in New York City. More specifically, data from the 1967 Survey of Economic Opportunity and information concerning the labor market and family incomes were used to estimate the likely impact of these programs on work decisions, the costs of the programs, and whether there should be voluntary state or local supplementation of federal payments. Findings of the study include: (1) There is evidence indicating that the hours of work of male heads of families in New York City are more responsive to changes in economic incentives than the hours of work of male family heads in the rest of the nation, and (2) If the Family Assistance Plan is enacted, there will be an appreciable reduction in the supply of low-wage male labor. (JS)

ED 066558

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David H. Greenberg

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This study was sponsored by the City of New York and by the New York City-Rand Institute. Its contents, however, do not purport to represent the official views or policy of the City of New York.

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PREFACE

This is one of several studies sponsored by New York City's Economic Development Administration and concerned with the operation of the City's labor market. The Report is based on an empirical analysis of the effects of proposed income maintenance programs. The Survey of Economic Opportunity was used to obtain estimates of the labor supply parameters required to assess the implications of these programs for hours of work of male family heads living in New York City. These estimates were used in a simulation of the costs, the impact on incomes, and the changes in work patterns that might result from the extension to the working poor of income maintenance programs incorporating negative income tax principles.

Although this Report is concerned with New York City, it uses an analytical framework that is virtually identical to that jointly developed by Marvin Kosters of the Council of Economic Advisers and David Greenberg of Rand for a study of the potential national consequences of proposed income maintenance programs. Dr. Kosters can therefore in a very real sense be considered a co-author of this Report. The author is also indebted to Rand colleagues Arthur J. Alexander, Stephen J. Carroll, Ronald K. H. Choy, and William A. Johnson, for a number of valuable comments and suggestions.

SUMMARY

Widespread dissatisfaction with the existing welfare system has resulted in numerous proposals for reform, many of them incorporating negative income tax principles. Two such proposals have recently received serious public consideration: The Family Assistance Plan (FAP) advocated by the present administration in Washington and a similar plan recommended by the President's Commission on Income Maintenance Programs (PC). Possibly the most important departure in both proposals is the extension of income supplements to poor families headed by working males.[1]

This provision has been the center of considerable controversy because of the possibility that fathers and husbands who earn low wages and would be covered by the program might be discouraged from working. This has several implications for the city:

1) If there were a substantial reduction in work effort, employers of low wage males would face greater labor shortages and, as a consequence, wages and ultimately prices would increase.

2) The reduction in labor force participation may be greater in New York City than in other parts of the country. If this were the case, employers might be encouraged to move to areas where pools of low cost labor remained.

3) The ultimate budgetary cost of the program will depend on its effect on work incentives. The subsidy paid to poor families under the program increases as the hours of work and, hence, the earnings of these families decrease. If the work disincentive effects of the program are substantial, the increase in program budgetary costs may also be substantial.

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[1] In New York City with its Home Relief Program, this is a somewhat less marked departure than in most of the rest of the country.

4) The political acceptability of the program also hinges on its impact on labor supply. In a work-oriented society, taxpayers are likely to rebel at substantial subsidization of the leisure of others.

Clearly, some knowledge of the extent to which federal reform of the welfare system will actually reduce the supply of low wage labor in New York would be helpful in determining the city position toward this reform.

Data from the 1967 Survey of Economic Opportunity are used to obtain estimates of the likely impact of FAP and PC on the work decisions of the male heads of New York City families. The cost of these programs and their impact on incomes are then projected from these estimates.

The study examines another important issue that will face the city if FAP or PC or a similar program is eventually implemented: whether or not there should be voluntary state or local supplementation of federal payments. State supplementation of the difference between the proposed federal payment level and the current payment level would be required for most of those currently eligible for welfare; but supplementation is neither required nor precluded for poor households headed by working males. Thus, the city (or the state) may elect to supplement the incomes of those households on its own.

Negative income tax programs such as FAP and PC incorporate two major dimensions, both of which influence labor supply. First, they pay a subsidy to particular families. Although this subsidy can be used to purchase more market goods, part of it can also be used to purchase increased leisure. Second, these programs would impose what is, in effect, a tax rate on income, thereby reducing the amount of market goods and services that can be obtained in return for an hour's work. This, in turn, encourages those who are taxed to reduce their work effort. An analysis of the impact of negative income tax programs on hours of work requires estimates of the labor supply response to both program dimensions.

Estimates were obtained of the labor supply response to variation in the family head's wage rate and in family income by measuring differences in annual work hours of employees having different wages and levels of nonemployment income. In addition, other variables were included in the analysis to control for differences in work hours resulting from other factors.

Estimates for New York City families were then compared with estimates for the nation as a whole. This comparison suggests that, for each additional dollar of income maintenance received, male heads of families located in New York City would reduce their work effort by a somewhat greater amount than male family heads in the rest of the nation. This difference is due, in part, to a greater negative work response in large metropolitan areas. Even so there is also evidence that the reduction in work effort would be greater in the city than in these metropolitan areas.

The estimates of the impact of FAP and PC depend upon the validity of a number of assumptions and cannot be regarded as precise. For this reason, several sets of alternative estimates are presented in the Report. The set discussed in this Summary was selected on the basis of the assembled evidence and the writer's judgment as to which set of estimates most closely approximates the potential effects of the program analyzed.

The most interesting results, from the perspective of immediate policy implications, are for families that would receive both FAP payments and food stamps. These families are the chief concern of the legislation now before Congress. The results indicate that almost 100,000 New York City families headed by males under 62 years of age would be covered. They would receive an estimated total subsidy (FAP payments plus food stamps) of around $163 million. An additional 150,000 households would be eligible for about $37 million worth of food stamps, but ineligible for FAP. The heads of families covered by both FAP and food stamps would reduce their hours of work by around one-fourth, while those covered only by food stamps would reduce their hours by about one-fifteenth. This decline in work hours would reduce

by about 2.2 percent the total hours worked by all married male family heads in the city under 62 years of age. The value of the output produced by such persons would fall by about 1.6 percent. The impact of the program recommended by the President's Commission on Income Maintenance Programs would be similar to that for FAP plus food stamps.

State and local supplements to FAP or to PC would cause a dramatic increase in the program's impact. The total subsidy to the estimated nearly 350,000 city families headed by males under 62 years of age that would participate in an income maintenance program incorporating FAP, food stamps, and supplements would be about one billion dollars. This is a five-fold increase over the amount that would be paid under FAP and food stamps alone. As a consequence, the total hours worked by all married male heads of families in the city would fall by over 8 percent and the total output produced by these men would be reduced by over 6 percent.

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I. INTRODUCTION

The adoption of a social innovation is frequently triggered by the conspicuous failure of existing policy. Widespread dissatisfaction with the present welfare system has resulted, for example, in serious legislative consideration of a program incorporating negative income tax principles. But while major departures in social policy may give rise to expectations of significantly improved performance, their actual results are far less certain than those of incremental changes in policy. For instance, the President's proposed Family Assistance Plan, embodying the concept of a negative income tax, has generated a considerable controversy over the program's cost and the extent to which program participants will alter their working patterns. Resolving these issues requires knowledge of the relationship between wage and income changes and work decisions, which permits inferences about work incentive effects of alternative income maintenance plans. Those incentive effects determine, in turn, the work patterns of those under the program and the ultimate cost of the program.

Although there is considerable uncertainty about the national consequences of an adoption of a federal negative income tax, there is even less knowledge of localized effects in major metropolitan areas such as New York City. For example, a federal program may reduce the supply of low wage labor within New York City. But by how much? And if state or city supplements are added to the federal payments, how great an additional adjustment in the labor supply will they cause? How much in fact, will the supplements cost? This Report addresses itself to such questions as these. Although it is concerned with New York City, the New York City study was itself a part of a larger study of the potential national consequences of proposed income maintenance programs.[1] Results from the national study are reported in a companion Report[2] and will be referred to from time to time for useful comparisons.

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[1]The national study, however, was limited to proposed federal programs. This Report considers the implications of state supplementation of federal programs.

[2]See David H. Greenberg and Marvin Kosters, *Income Guarantees*

Information on the manner in which wage and income changes affect work choices can be obtained only by estimating labor supply functions. Data for such estimates may be provided by specially designed pilot studies or from existing cross-sectional data files in which wage rates and incomes differ among families. Although pilot programs are in many ways superior to inferential studies based on cross-sectional data, they are expensive and time consuming. Policy decisions frequently cannot await their completion.[1] In addition, the results from a pilot experiment may be distorted by the participant's knowledge that the program is transitory. Pilot studies are also carried out in fairly narrow geographic areas. Thus, the applicability of their results to areas not included in the experiment, such as New York, may be open to question. This inferential study, therefore, is a useful supplement to and check on on-going pilot studies.

In this study, existing data were used to obtain estimates of the impact of wage and income differences on the work decisions of residents of New York City. These estimates were then used to make inferences about the costs, the impact on incomes, and the changes in work patterns that might be expected from covering the "working poor" within the city by proposed income maintenance programs. The substantial increase in income supplements available to the working poor is one of the major new departures of proposed programs; moreover, the working poor constitute a significant segment of society. Uncertainty about the impact

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and the Working Poor: The Effect of Income Maintenance Programs on the Hours of Work of Male Family Heads, R-579-OEO, The Rand Corporation, Santa Monica, December 1970.

[1]For example, the following comment appears in a preliminary report on the New Jersey experiment, the best known and earliest of the negative income tax pilot programs: "The relevance of this experiment to the ongoing discussion of Nixon's Family Assistance Plan and Welfare reform in general is genuine enough; but because it is still a long way from completion, these results must inevitably be both less comprehensive and less powerful than many people would like them to be, or think they should be." Harold W. Watts, *Adjusted and Extended Preliminary Results from the Urban Graduate Work Incentive Experiment,* Institute for Research on Poverty Discussion Paper, University of Wisconsin, Madison, June 10, 1970, p. 1.

on this group is, therefore, a major element in the uncertainty about program costs, and the focal point of public concern over possible unfavorable effects on work behavior.

Even within the context of estimating program impact on the working poor, however, this analysis is limited in two major ways: (1) The degree to which workers might have an incentive to withdraw completely from the work force was not considered. (2) The results pertain only to married male family heads under 62 years of age. In terms of hours worked and earnings, this group is by far the most important to be covered by most proposed programs. But it is certainly not the only significant group. The reasons for these restrictions on the scope of the study are discussed in some detail in Appendix A.

Section II discusses the model. Section III describes measures of the variables that are used in the model. The data and sample are also briefly discussed in this section. A major innovation of this study is the effort to control for the influence of preference differences on the observed relation between income and work choices. This effort is discussed in Section IV. Estimates of the effects of changes in the wage rate and in nonemployment income on hours of work are reported in Section V. These estimates are used to take into account the effect on hours of work of negative income tax programs in a simulation of the results of several proposed programs. The analytic framework for the simulation and the programs considered are discussed in the first two parts of Section VI. The simulation results themselves are presented and discussed in the last part of that section.

II. THE MODEL

Many of the factors that must be taken into account in an empirical analysis of the effects of wage rate and income changes on labor supply are best understood in terms of the theory of consumer behavior. Since much of this theory, as it applies to labor supply estimates, is discussed in considerable detail elsewhere,[1] only a brief sketch will be presented in this section. One aspect of the theory that has been virtually ignored in previous empirical work is the way in which observed relationships are affected by differences in preference structures.

LABOR SUPPLY

Economic analysis of labor supply uses the framework of consumption theory to analyze how an individual divides his time between work and leisure. The theory decomposes supply responses to changes in economic incentives (higher wages, for example) into substitution and income effects.

The hourly wage rate is a measure of the amount of market goods and services that can be obtained in return for an hour's work (in return for giving up an hour of leisure). Since a higher wage rate yields more market goods for a unit of leisure forgone, higher wage rates create an incentive to work more and consume less leisure. This tendency to work more in response to higher wage rates because of the more favorable rate at which leisure can be exchanged for market income is called the substitution effect.

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[1] See, for example, Marvin Kosters, *Income and Substitution Effects in a Family Labor Supply Model*, P-3339, The Rand Corporation, Santa Monica, December 1966; Marvin Kosters, "Effects of an Income Tax on Labor Supply," *The Taxation of Income from Capital*, The Brookings Institution, Washington, D.C., 1969; Jacob Mincer, "Labor Force Participation of Married Women," *Aspects of Labor Economics*, Princeton University Press, Princeton, 1962, pp. 63-105; Glen G. Cain, *Married Women in the Labor Force*, The University of Chicago Press, Chicago, 1966; and William G. Bowen and T. A. Finnegan, "Labor Force Participation and Unemployment," in Arthur M. Ross (ed.), *Employment Policy and the Labor Market*, University of California Press, Berkeley, 1965, pp. 115-161.

At a given amount of work, a higher wage rate also produces a higher income level. Increased income allows the purchase of both more market goods and more leisure, and we normally expect this increased income to be divided in some manner between increased purchases of each. This tendency to work less because the increased income resulting from higher wages allows consumption of both more market goods and more leisure is called the income effect.

The net effect of higher wages on labor supply thus depends on the relative strength of two forces working in opposite directions -- the substitution effect and the income effect. Current market work, however, is not the only source of income because many individuals receive income from nonemployment sources. Equity in the form of housing, pension rights, stocks and bonds, savings accounts, and the like represents the principal source of nonemployment income. Income from these sources, to the extent that it is an assured, steady flow, affects work decisions, but only through the income effect. Income from nonemployment sources, therefore, permits the estimation of an income effect. This income effect estimate can be used to adjust for the income effect associated with wage rate changes to obtain an estimate of the substitution effect.[1]

To illustrate how estimates of these labor supply parameters are obtained, consider the response of a worker initially supplying L units of labor at the wage rate W. A change in the wage rate, dW, causes a change in income of $dY = LdW$. The net effect of the wage rate change is dL/dW, and the component that is a result of the associated change in income is $(dL/dY)(dY/dW)$. The derivative dL/dY represents the effect of a change in income with no change in the wage rate, such as the receipt of an annuity, and L can be substituted for dY/dW. The component of the individual's labor supply response attributable to the income effect, $L(dL/dY)$, must be subtracted from the net effect of the wage rate change to obtain an estimate of the substitution effect.

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[1]It is implicitly assumed that the income effect associated with wage income is the same as that associated with nonemployment income. The conceptually appropriate measure of nonemployment income and empirical approximations of it are discussed in some detail in Sections III and V.

Thus, the expression for the substitution effect or the "income-compensated" effect of the wage rate change is:

$$S = \frac{dL}{dW} - L\left(\frac{dL}{dY}\right) \quad .$$

Or in elasticity form:

$$\varepsilon^{s} = \left(\frac{dL}{dW}\right)\left(\frac{W}{L}\right) - \frac{(WL)}{Y}\left(\frac{dL}{dY}\right)\left(\frac{Y}{L}\right) \quad .$$

The two opposing effects of a wage rate change can be estimated from information on the labor supply response of the typical worker to a change in his wage rate, (dL/dW), and his response to changes in income from nonemployment sources, (dL/dY). Obtaining estimates of labor supply response to these two variables is, therefore, the principal concern of the first part of this study.

Labor supply response parameters were estimated by multiple regression techniques in which a measure of labor supply was regressed on measures of the wage rate, nonemployment income, and other variables. The additional variables were used to attempt to hold constant non-relevant differences (differences between workers other than in incomes or wages). Since cross-sectional data are used, the response of a particular worker to changes in his income or wage rate is not measured directly. Instead, differences in work choices of workers with different wages and levels of nonemployment income are measured. It is assumed that the systematic relation between work choices and differences in income levels and wage rates can be used to infer the response of a typical worker faced with changes in these variables similar to the differences observed.

Applying the framework discussed above to a member of a family unit instead of to an individual who constitutes an autonomous decisionmaking unit introduces additional complications but it does not alter the basic approach. The application of the model to the more complex family situation is discussed later.

THE INFLUENCE OF PREFERENCE DIFFERENCES

The standard labor supply theory described in the previous section predicts that an income-compensated change in the wage rate will have

a positive effect on labor supply, and that a change in income accompanying the wage change will have a negative effect. Empirical studies have generally indicated that the income effect outweighs the substitution effect, leading to a net negative relation between wages and labor supply. Yet in many studies the income effect implied by estimates based on income from nonemployment sources has been inconsequential or too small to be consistent with the size of the income effect implied by estimates of the effects of wage changes.[1]

The standard theory is developed for a worker with a specified structure of preferences. Dispersion in preference structures is typically ignored in demand studies designed to explore the effects of prices and incomes on the quantity demanded of a good, since preference differences can usually reasonably be assumed to be distributed independently of prices and incomes. In the context of labor supply, however, it is more reasonable to expect significant interaction between differences in preference structures and the work choices and asset accumulation patterns that give rise to observed labor supply and nonemployment income. Neglecting the influence of preference differences may lead to empirical results that fail to conform to the predictions of theory.

In considering the influence of preference differences on work-leisure choices, it is useful to distinguish among three general "goods": leisure, current market goods consumption, and asset accumulation. Current consumption of market goods and asset accumulation, both involving work effort, can be chosen as alternatives to leisure. Differences in preference structures among individuals or consumer units can be expected to result in different combinations of these goods chosen with a given set of relative prices. Since dispersion in preferences for current consumption of market goods relative to leisure will not automatically result in any systematic relation between

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[1]See Kosters, "Effect of an Income Tax on Labor Supply"; Malcolm S. Cohen, Samuel A. Rea, Jr., and Robert I. Lerman, *A Micro Model of Labor Supply*, BLS Staff Paper 4, U.S. Department of Labor, Bureau of Labor Statistics, 1970; E. D. Kalachek, and F. Q. Raines, "Labor Supply of Lower Income Workers," *Technical Studies*, The President's Commission on Income Maintenance Programs, Washington, D.C., 1970.

the labor supply and the wage rate or nonemployment income, it can in principle be ignored. Dispersion in preferences for asset accumulation relative to leisure, on the other hand, results in a systematic relation between levels of nonemployment income and work effort that must be taken into account in estimating income effects.

Persons with relatively strong preferences for asset accumulation will tend to work more and consume less leisure than others at a given wage rate. These same persons will also have larger than average asset holdings for persons of a similar age and earning capability and these asset holdings are the principal source of nonemployment income. The income stream from the larger than average asset holdings, taken by itself, will tend to depress labor supply through the income effect. The strong preferences for asset accumulation relative to leisure, on the other hand, would be expected to result in a positive relation between labor supplied and the level of asset holdings and nonemployment income. Thus, if preference differences have an important influence on choices between leisure and asset accumulation, estimates of the impact on labor supply of nonemployment income will be significantly diluted if no attempt is made to control for preference differences. That is, observed work choices will reflect not only the negative impact on labor supply of income from nonemployment sources but also a preference-induced tendency for high levels of asset holdings to be accompanied by relatively high levels of work effort.

The influence of dispersion in preferences on estimates of the effect on labor supply of nonemployment income is illustrated in Fig. 1. The relations considered there are discussed in terms of cross-sectional observations on a labor supply variable, the wage rate, and nonemployment income. For persons with a given wage rate and no differences in preference structures, the income effect on labor supply of an increment of nonemployment income, ΔY, would be estimated as ΔL. The points P_1 and P_2 represent choices within a given structure of preferences; that is, I_1 and I_2 are members of a single set of indifference curves. The negative relation between labor supply and nonemployment income conforms to theoretical expectations.

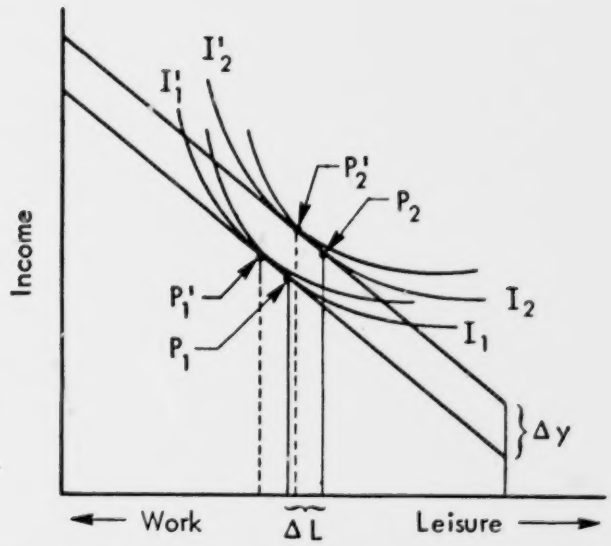

Fig. 1 -- Influence of dispersion on estimates of the effect of nonemployment income on labor supply

If preference differences have little influence on work choices and asset accumulation patterns, observations on labor supply for two individuals with differing amounts of nonemployment income and similar wage rates can be expected to conform to the pattern indicated by points P_1 and P_2. But if preference structures do differ among individuals and influence work choices and asset accumulation, the presence of a greater than average amount of income from nonemployment sources may be a consequence of a relatively strong preference for asset accumulation. The family of indifference curves representing the preference structure of the greater than average asset accumulator would be represented by indifference curves such as I'_1 and I'_2. P'_2 would represent his work choice, while P_1 would represent the choice of the average asset accumulator. In this case, the observed labor supply choices of the two individuals will reflect preference differences as well as income differences, and these observations would be represented by such points as P_1 and P'_2.

If preference differences are ignored, the estimated income effect would be weaker than the actual income effect within a single given structure of preferences as illustrated in Fig. 1. Significant interaction among preference differences and work choices and asset accumulation will result in a systematic tendency toward underestimation of the income effect. Indeed, a sufficiently strong relation between preference differences and work choices motivated by differences in desired asset accumulation could lead to positive estimates of the effect on labor supply of the nonemployment income stream from asset holdings.

In econometric terms an assumption that preference differences are distributed independently with respect to asset holdings results in correlation between the residual and one of the independent variables -- nonemployment income -- if no variable to control for preference differences is included. A variable controlling for preference differences would capture any systematic tendency for higher levels of asset accumulation to be accompanied by more work effort. A preference control variable would, therefore, be expected to have a positive sign, and its inclusion would be expected to lead to a more pronounced negative relation between labor supply and nonemployment income. The construction of such a variable and evidence of its influence on income effect estimates are discussed in Section IV.[1]

LABOR SUPPLY IN A FAMILY CONTEXT

The labor supply model outlined above is, strictly speaking, only applicable to individuals. Extending the model to a family situation raises several questions: Who makes the labor supply decisions? What wage and income variables are relevant to these decisions? How are the principal alternatives affected by differing family sizes and structures?

With respect to the first question, the family is regarded as the appropriate unit of analysis, and, correspondingly, labor supply

[1] A statistical discussion of the role of preference differences and the preference measure that is used is presented in Appendix D of the national study.

decisions are regarded as family decisions.[1] The family is assumed to reach these decisions through a choice based on the total resources or potential income of the family and the structure of wage rates or earning capabilities within the family. The labor supply choice for each family member will, therefore, depend not only on his own wage rate but also on that of other family members and on the total resources available to the family. The income of the family from market work reflects the outcome of choices that are made in an effort to secure a maximum level of family welfare.

The variables relevant to the labor supply choices of a family member are those that can be regarded as exogenous -- that is, not themselves a result of choices of another family member. The principal economic variables that can be regarded as exogenous for cross-sectional analysis are nonemployment income and the set of wage rates.[2] The data, unfortunately, do not provide us with a complete set of wage rates for all observations that would be necessary if each family member's labor response were estimated strictly from reduced form equations. Many family members, for example, are potential rather than actual earners, and wage rates, of course, are not available for such individuals. Although no completely satisfactory way to handle this problem was found, two approaches were used to examine the sensitivity of the estimates. As one alternative, the earnings of the spouse and of other family members are used as independent variables. As an alternative, separate regressions were computed for a subgroup of families in which the only earner is the head of the family.

Variation in family size may lead to differences in market income needs thus affecting work decisions. Moreover, the presence of children can substantially influence nonmarket or home work, which is treated as a component of "leisure" in our analysis. The effects of variations in

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[1] Mincer, "Labor Force Participation of Married Women;" Kosters, "Effects of an Income Tax on Labor Supply;" Cain, *Married Women in the Labor Force*.

[2] Over time, of course, nonemployment income levels are in part a result of past choices, but this is also true with respect to wage rates.

family size and structure on the character of alternatives relevant in labor supply choices are likely to have their more important influence on choices for the wife instead of the male head, because variation in nonmarket work will usually be a secondary consideration for him. However, because differences in family size do influence market income needs, I attempt to control for these differences.

CONTROLLING FOR DEMOGRAPHIC AND OTHER DIFFERENCES

The main concern of this study is to obtain estimates of wage rate and income effects. Hence, demographic and other control variables are analyzed because of their possible influence on these estimates, rather than for their own direct impact on the labor supply. Simply including a selection of control variables without allowing interactions with wage rate and income variables allows for differences in the intercept attributable to these variables, but it does not permit estimates of how they influence labor supply responses to wage and income changes.

Among the factors explicitly excluded from the regressions are occupation and industry. These variables have been included in some studies in an attempt to account both for demand and supply differences and for institutional constraints on normal working hours.[1] They were excluded from this analysis because shifts between occupations and industries are regarded as one of the avenues workers use to satisfy their hours preferences. This approach to the estimation of labor supply response parameters implicitly assumes that workers are, in general, able to find employment situations consistent with their hours preferences, and that differences in demand have no important systematic influence on their hours choices.

An alternative approach to the inclusion of a large number of variables in the regressions is to compute separate regressions for a number of demographic and economic subgroups. This approach allows for complete interaction among the variables. Unfortunately, the

[1] See, for example, Kalachek and Raines, "Labor Supply of Lower Income Workers."

rather small New York City sample made a direct application of this approach untenable. Nevertheless, separate regressions were computed for subgroups of a national sample and for subgroups of a sample of city dwellers. And since it is felt that these results have some applicability to New York City, they are briefly summarized in Part V.

III. THE VARIABLES AND THE DATA

The variables of primary interest in this study are the labor supply measure, the wage rate, nonemployment income, and a measure of preference differences. I shall briefly present measures of the first three of these variables and of other variables. A discussion of the measure of preference differences is postponed until Part IV. A short discussion of the data and the sample is also included.[1]

THE DATA

The analysis is based on a sample drawn from the 1967 Survey of Economic Opportunity file. It included households headed by married men less than 62 years old in families whose incomes did not exceed $15,000 in 1966. The ways in which it was necessary to restrict this basic sample, such as excluding units in which the head had no work experience in the preceding year, are discussed in detail in Appendix A. The restricted sample for New York City consisted of 305 observations.

THE WAGE RATE

The Survey of Economic Opportunity data have some features that make them distinctly superior to most available data for analyzing labor supply behavior. A measure of the hourly wage rate can be obtained in a relatively direct manner because both earnings and hours worked during the week preceding the interview are reported. Although the measure refers only to a single week, the wage rate is less likely to be affected by abnormal hours than when earnings data are available only for the preceding year, as in the case of data from the regular Current Population Survey or the decennial census.

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[1] A detailed description of the data, the sample, and the construction of the variables is presented in Appendix A.

MEASURING NONEMPLOYMENT INCOME

The Survey of Economic Opportunity contains much more detailed information on sources of nonemployment income and wealth position than is typically available. It is, therefore, possible to identify nonemployment income by source in order to analyze differential responses and to exclude from consideration observations in which nonemployment income is strongly conditioned by labor supplied. The detailed information on asset holdings allows imputation of nonemployment income to these assets and permits the construction of a variable to measure preference differences. In addition, it is likely that eliciting information at this level of detail has reduced misreporting and underreporting of nonemployment income.

Variation in income that does not result simply from differences in the wage rate is necessary to estimate the effect of income on labor supply. Income from nonemployment sources generates differences in income that do not simultaneously involve differences in the rate at which leisure can be translated into income. The measure of nonemployment income that is conceptually appropriate for estimating income effects comparable to those accompanying wage rate differences is the income flow that could be sustained over a family head's expected working life from the conversion of the family's assets and nonemployment income payments into an annuity. This conceptually appropriate measure can only be approximated from the available data.

The data available to construct a measure of nonemployment income include income payments received in the preceding year from various nonlabor sources and information on the asset position of the family. These data are likely to be subject to considerable measurement error. And, perhaps more important, they may be so strongly influenced by transitory factors that they depart significantly from the conceptually appropriate annuity concept.

Two measures of nonemployment income were constructed on the basis of information on nonemployment income payments and the asset position of the family. The first measure treats income and assets on an accrual

basis. That is, income is imputed to all important assets -- based on the present value of equity in the assets -- and added to nonemployment income from other sources. This measure of accrued nonemployment income (Y^a) regards a dollar of imputed income from assets as equivalent to a dollar of current income payments from nonemployment sources.

In the second measure of nonemployment income, income flows are emphasized instead of accrued nonemployment income. The difference in the two approaches is most easily illustrated by an example. Consider the situation of a family that owns its home. Its income from that source on an accrual basis would be calculated by simply imputing a return to equity in the home. In terms of income flows, however, the homebuyer is committed, as a first approximation, to payments that are equal to those of the renter of a similar dwelling, less an imputed return on his down payment. That is, although the renter's payments are based on the full value of the home, the owner's payments depend on what he still owes after his initial down payment. Both, however, receive a return from their place of residence that is equal to its rental value. Thus, until the homeowner's mortgage is paid off, his income flow can be regarded as differing from that of the renter only by the imputed return on his down payment. Once the home is completely paid for, the owner receives the full rental value imputed to the home.

The reasoning illustrated in the previous paragraph was applied to the home and to other assets to construct a measure of imputed nonearned income based on a flow rather than accrual concept. Construction of the flow version of the nonearned income variable (Y^f) was completed by adding imputed income to actual nonemployment income receipts, such as interest payments.

One reason for considering the flow measure of nonemployment income as an interesting alternative to the accrual measure is that the effect of income on labor supply behavior is often viewed as a reflection of current income needs relative to the income available to sustain those needs. The flow measure of income from nonemployment sources may be more appropriate for measuring additional income available to meet current needs. A second reason is that the future is

always imperfectly perceived and future income correspondingly uncertain. Income prospects for the more distant future may be so heavily discounted that current income flow information more adequately reflects perceptions about nonemployment income than a measure of accrued income. The underlying economic reason for distinguishing between income flows and accruals is that the capital market transactions necessary to transform accrued income into a smooth flow of current income may be sufficiently expensive to effectively preclude such activity when a large number of relatively small transactions would be required.

EARNINGS OF SECONDARY WORKERS

As noted earlier, since a complete set of wage rates for all family members is not available, the annual earnings of the spouse and of family members other than the husband or spouse were utilized as independent variables. These two variables depend on both the hours worked and the wage rates of family members other than the head. As such, the variables carry at least three effects: an income effect, a cross-substitution effect, and a taste effect. The first two effects should be negatively related to the head's work effort, and the third should be positively related. The income effect produced by the earnings of others is completely analogous to that produced by nonemployment income. Some of the earnings of others can be used to purchase leisure for the husband himself. The amount of leisure taken by the husband is also positively related to the wage rates of others. The higher these wage rates are relative to his, the greater the extent to which the labor of others in the family is likely to be substituted for his. The number of hours worked by secondary family workers is also indicative of a family's taste for income relative to leisure. And the stronger this taste, the greater is likely to be the family head's work effort, as well as the work effort of secondary family workers.

OTHER CONTROL VARIABLES

The following demographic control variables were included in the labor supply regressions.

Age

It is conventionally assumed that younger and older workers have a greater preference for leisure than prime age workers, and that they fare more poorly in the labor market. Thus, a quadratic of age (age and age squared) is used in the regressions.

Education

The variable years of school completed is entered in the regressions linearly. The longer a person remains in school, the greater is his incentive to recoup his investment by working additional hours.

Race

Whites and nonwhites are distinguished by a dummy variable. Nonwhites were assigned a one and whites a zero.[1]

Health

Interviewees were asked whether their health affected their work. Persons who indicated that it did were assigned a one and all others a zero. Presumably, persons with poor health work fewer hours than healthy persons.

Dependents

This variable is the number of persons in the family, excluding the head and his spouse. The husband's incentive to work should increase with the number of his dependents.

THE LABOR SUPPLY MEASURE

Since this study is concerned with a worker's potential response to changes in his income and wage rate, the number of hours he would

[1]It would have been useful to include a variable for Puerto Ricans as well. Unfortunately, the SEO file does not separately identify Puerto Ricans or persons with Spanish surnames.

like to work during a year, rather than the hours he actually did work, appears to be the most appropriate measure of his labor supply. The measure of potential work effort that is used is the product of the number of weeks working or looking for work in 1966, and the number of hours worked during the week preceding the survey interview.[1]

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[1] I experimented with an alternative measure of the potential labor supply that attempted to adjust for the fact that some persons work more or fewer hours than they would like. Involuntary part-time workers were assigned a value of 40 hours. Similarly, those who were working more than 24 hours, but who expressed a preference for part-time work, were assigned a value of 24 hours. The resulting measure of weekly hours was multiplied by the number of weeks in the labor force. Regressions that used actual hours of work, that is, actual hours times actual weeks, as the dependent variable were also run. Since the simple correlations between these two measures and the measure ultimately adopted are over .97, the choice of one of these variables has little influence on the results. The reported measure, however, seems more appropriate than actual hours and less subject to conjecture than the alternative measure of potential annual hours.

IV. A MEASURE OF PREFERENCE DIFFERENCES

The major innovation in this study, as compared with previous empirical analyses of labor supply, is the attempt to control for differences in preference structures. The analysis of the role of preference differences enables a reappraisal of the results of earlier studies in which preference differences were ignored, and provides a more reliable estimation of the impact of wage and income changes on labor supply.

CONSTRUCTING THE PREFERENCE VARIABLE

Differences in preference structures cannot be observed directly; they can only be inferred from the choices made by consumer units. One way of constructing a variable to represent differences in preferences for asset accumulation would be simply to use a measure of wealth position. If a wealth position variable were included in a regression along with a nonemployment income variable, however, the two variables would differ only by a multiplicative constant aside from dispersion reflecting differences in asset holding patterns and some components of nonemployment income that are not strictly dependent on asset holdings as normally measured. More important, perhaps, such an approach would disregard the distinction between differences in wealth position attributable to factors such as age and the wage rate and differences attributable to dispersion in preference structures.

A variable designed to measure relative preferences should not only take into account how large an individual's asset holdings are relative to those of an "average" person with the same age and wage rate, it should also be designed to reflect the economic significance, relative to his earning capability, of a discrepancy between his actual asset holdings and the typical holdings of an otherwise similar individual. The measure of relative preferences for asset accumulation used in this study was developed on the basis of these two principles. The variable is a measure of the difference between an individual's actual asset holdings ratio and the typical ratio prevailing for a household headed by a male with a similar age and wage rate. Typical or expected asset

holdings were estimated from a regression on the wage rate,[1] the wage rate squared, and age -- variables normally regarded as exogenous in the context of the traditional labor supply model. The residual from such a regression was then divided by the present value of full time earnings plus predicted asset holdings. The measure can also be interpreted as the difference between the fraction of income from full time work and normal asset holdings that an individual actually receives in a given year from nonemployment sources and the fraction that an individual with that age and wage rate would normally be expected to receive.

Actual wealth position depends on factors other than accumulation through past work effort, of course, such as inheritance and fortuitous investment choices. Current measures of assets are also highly imperfect measures of desired wealth because they are likely to reflect transitory factors such as short term saving or dissaving for major purchases. Thus, the relative asset preference measure used here can at best be no more than a crude control variable for the variation in hours that is systematically related to nonemployment income, but attributable to differences in preferences for asset accumulation.

ESTIMATING THE PREFERENCES VARIABLE

The first step in constructing a measure of relative preferences for asset accumulation was to obtain predicted values for the levels of asset holdings expected for typical families. This was accomplished by regressing the net value of the family's assets on the age of the family head, his wage rate, and his wage rate squared. These variables were chosen because the asset holdings are strongly related to them, and they are normally regarded as exogenous in a model of labor supply. The variance of the estimate could no doubt be substantially reduced

[1] The dependent variable used in these regressions is family net worth, the difference between assets and liabilities. It would in principle be preferable to limit the measure to those components of net worth that reflect only the past work efforts of family heads.

by including a selection of other variables such as number of dependents, or whether the family is renting or buying a home. Variables of this sort, however, are jointly determined along with variables such as those reflecting work choices. Including such jointly determined variables in a regression to predict asset holdings would give rise to the danger that any influence of the preference measure in a labor supply regression would be a result of systematic relations among a set of jointly determined variables. That is, predicted asset holdings should be free of any differences in preference structures that affect asset holding, so that the measure of relative preferences is permitted to reflect these differences in preference structures.

The regressions estimated to construct the preference variable are presented in Table 1 for a national sample and for three progressively narrower geographic subsets of the national sample. The narrowest of the three subsets is the New York City sample itself.[1]

The value of asset holdings is significantly affected by age and earning capability of the family head. Predicted assets increase by around $300 in the larger geographic areas and by nearly $200 in New York City for each additional year of age of the family head. The smaller coefficient for New York City may well be associated with the fact that many New York City residents rent. The amount of equity held in a home is, in general, particularly closely associated with age.

The predicted value of assets also increases by $3000 to $4000 for every $1 increase in the hourly wage rate at relatively low wages, and it increases at a decreasing rate. The larger coefficients for the

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[1]The results presented in this Report will focus on these four samples, especially the first and the last. From time to time, however, results for other subgroups of the national sample will be noted. The three larger samples provide the basis for a useful comparison with New York City. Ultimately, I will attempt to determine whether the labor supply behavior of New York City residents differs from that of persons who live elsewhere. Because of their size, the three larger samples also provide more reliable statistical estimates than the New York sample.

Table 1

ESTIMATED COEFFICIENTS OF REGRESSION EQUATIONS TO PREDICT THE VALUE OF ASSET HOLDINGS ACCUMULATED BY HOUSEHOLDS[a]

Geographic Group[b]	Age Coefficient (A_h)	Wage Rate Coefficient (W_h)	Wage Rate Squared (W^2_h)	Intercept	R^2
1. Basic national male family head sample	322.41 (13.26)	3186.6 (147.43)	-74.828 (6.17)	-13558	.14
2. Households, central cities	288.64 (19.47)	4458.0 (287.90)	-176.717 (20.99)	-16763	..18
3. Households, large central cities	287.14 (25.57)	4922.9 (442.26)	-216.675 (36.82)	-18153	.17
4. Households, New York City	193.75 (36.02)	4504.51 (593.30)	-198.75 (34.59)	-14600	.25

[a]Numbers in parentheses are standard errors. All of the coefficients exceed their standard errors by more than a factor of 2.

[b]Geographic group descriptions:

Row 1. Sample of male family heads (see Appendix A for details on how the SEO sample was restricted for the regression sample), excluding those who were not working at their usual job in the week preceding the survey (6,044 observations).

Row 2. The portion of the basic male family head sample with homes located in the central cities (2,460 observations).

Row 3. The portion of the central city sample with homes located in Standard Statistical Metropolitan Areas with over 750,000 inhabitants (1,606 observations).

Row 4. The portion of the large central city sample with homes located in the New York City Consolidated Metropolitan Area (305 observations).

three central cities regressions may again be traced to the composition of the asset's portfolio. The amount of equity in one's own home, for example, may be less sensitive to the size of the wage rate than assets that are purchased solely for investment purposes.

Some curvilinearity of asset holdings with respect to age might be expected as well as interaction between age and the wage rate. Experiments to explore these possibilities showed that little increase in the explanatory power of the regression could be achieved in this way, and consequently the relatively simpler formulation was retained. The fraction of variance explained by the regressions is quite low. In addition to differences in preferences for asset accumulation, the remaining variance presumably reflects factors such as the element of chance in savings and investment decisions and differences in exogenous factors that could not be taken into account, such as inheritance.

The second step in constructing the preference variable was to divide the residual -- the difference between actual and predicted asset value -- by a measure of the normal or expected wealth of the family. The husband's earning capability is normally the main component of a family's human wealth, although in a more complete and exhaustive analysis of family labor supply the wife's wage rate and the probability that she will be a labor force participant should also be taken into account. Since estimates of earning capability for persons not in the labor force are not developed and the analysis is concentrated only on the labor force behavior of the husband, the element of human wealth represented by wives and other family members is neglected. This simplification can also be justified to some degree by the difficulty in assessing the potential home work contribution of the wife to the family's human wealth and the fact that the value of this contribution depends in part on such variables as the presence of children, which cannot be regarded as completely exogenous.

The value of the husband's earning capability was estimated by capitalizing the husband's full-time annual earnings (40 hours per week for 50 weeks at his reported wage rate) using a 10 percent discount factor. The residual was divided by this value plus the predicted

value of asset holdings ($\hat{M}_f$). The construction of the preference variable, P, can be concisely stated as follows:

$$\hat{M}_{fij} = a_i + b_i A_{hj} + c_i W_{hj} + d_i W_{hj}^2$$

$$P_{hij} = \frac{M_{fij} - \hat{M}_{fij}}{\hat{M}_{fij} + (40 \cdot 50 \cdot W_{hj})/.1} \quad ,$$

where the subscript i refers to a demographic group and the subscript j refers to the household.

V. LABOR SUPPLY PARAMETERS: THE EMPIRICAL RESULTS

Analysis of the impact on labor supply of alternative income maintenance programs requires estimates of two basic labor supply parameters. First, an estimate is required of the substitution effect, the labor supply response to changes in the rate at which leisure can be substituted for market income, to analyze the impact of changes in the implicit tax rate at a given level of income. Second, an estimate is needed of the income effect, the labor supply response to changes in nonemployment income, to analyze the impact of changes in the level at which income maintenance payments are set.

Estimates of the effects of the wage rate and nonemployment income on hours of work are presented and discussed in this section. The resulting estimates of wage rate elasticities, income-compensated wage rate elasticities, and income effects are presented and appraised in terms of their implications for the labor supply responses applicable to low income workers in New York City.

LINEAR ESTIMATES OF LABOR SUPPLY PARAMETERS

Estimates of wage rate and income coefficients are presented in Tables 2 and 3 for regressions allowing for only linear wage rate and income effects on hours of work. These regressions also include the full set of control variables. The fraction of total variance explained is relatively low, but this is not unexpected for regressions using disaggregated cross-sectional data. Hours of work of individuals cannot be predicted with any accuracy with the variables included in the regressions, but the results are not intended for this purpose. Instead, they are intended to predict the average performance of segments of the population on the basis of an analysis of individual choices. For this objective, the primary issue is not whether individual choices are accurately predicted, but whether the statistical evidence indicates significant underlying behavioral relationships. The existence of a systematic relationship between hours of work and the variables of primary interest is, in general, strongly supported by the usual statistical criteria.

Table 2

ESTIMATED WAGE RATE AND INCOME COEFFICIENTS FOR ACCRUED NONEMPLOYMENT INCOME WITH CONTROL VARIABLES FOR RELATIVE PREFERENCES AND FOR OTHER ECONOMIC AND DEMOGRAPHIC FACTORS[a]
(numbers in parentheses are standard errors)

Coefficients	Basic Nat'l. Male Family Head Sample	Households, Central Cities	Households, Large Central Cities	Households, New York City
Hourly wage (W_h)	-103.202 (4.773)	-105.049 (8.311)	-111.769 (10.692)	-113.383 (16.951)
Nonearned income (Y_f^a)	-0.069 (0.010)	-0.078 (0.017)	-0.072 (0.019)	-0.083 (0.052)[b]
Preference variable (P_h)	555.403 (56.749)	710.517 (103.518)	651.480 (120.007)	789.269 (366.853)
Earnings of spouse (E_s)	-0.017 (0.004)	-0.013 (0.006)	-0.008 (0.007)[b]	-0.006 (0.015)[b]
Earnings of others (E_o)	-0.026 (0.007)	-0.026 (0.010)	-0.031 (0.012)	0.004 (0.025)[b]
Age (A_h)	30.103 (4.969)	24.952 (7.195)	19.485 (8.820)	4.450 (18.829)[b]
Age squared (A_h^2)	-0.308 (0.061)	-0.222 (0.088)	-0.151 (0.108)[b]	0.035 (0.230)[b]
Number of dependents (D_h)	12.383 (3.721)	14.003 (5.287)	15.977 (6.545)	6.665 (16.347)[b]
Race, nonwhites = 1 (R_h)	-118.177 (15.383)	-147.360 (20.910)	-153.069 (25.771)	-100.551 (53.954)[b]
Grade completed (S_h)	27.270 (2.216)	28.807 (3.260)	27.494 (4.00)	23.365 (9.103)
Health limits work = 1 (K_h)	-131.387 (25.515)	-76.400 (40.376)	-119.101 (50.572)	-132.372 (111.702)[b]
Intercept	1637.801	1630.223	1735.437	2002.468
Summary Information				
R^2	0.134	0.135	0.133	0.184
Standard error of est.	1509.190	482.531	471.096	432.031
Mean of dependent variable (L_h)	2174.319	2121.374	2084.357	2068.718
F	84.558	34.876	22.298	5.993
No. of observations	6044	2460	1606	305

[a]The dependent variable is potential hours of work.

[b]Cases in which coefficients are less than twice their standard errors.

Table 3

ESTIMATED WAGE RATE AND INCOME COEFFICIENTS FOR NONEMPLOYMENT INCOME FLOWS WITH CONTROL VARIABLES FOR RELATIVE PREFERENCES AND FOR OTHER ECONOMIC AND DEMOGRAPHIC FACTORS[a]
(numbers in parentheses are standard errors)

Coefficients	Basic Nat'l. Male Family Head Sample	Households, Central Cities	Households, Large Central Cities	Households, New York City
Hourly wage (W_h)	-108.354 (4.034)	-112.630 (7.769)	-119.878 (9.969)	-117.481 (16.161)
Nonearned income (Y_f^f)	-0.067 (0.011)	-0.104 (0.020)	-0.101 (0.024)	-0.160 (0.063)
Preference variable (P_h)	374.387 (39.709)	517.303 (73.984)	469.887 (85.105)	784.737 (294.071)
Earnings of spouse (E_s)	-0.017 (0.004)	-0.013 (0.006)	-0.008[b] (0.007)	-0.009[b] (0.015)
Earnings of others (E_o)	-0.024 (0.007)	-0.024 (0.010)	-0.028 (0.012)	-0.005[b] (0.025)
Age (A_h)	27.537 (4.950)	21.621 (7.160)	16.081[b] (8.767)	4.531[b] (18.656)
Age squared (A_h^2)	-0.291 (0.061)	-0.189 (0.089)	-0.116[b] (0.108)	0.043[b] (0.228)
Number of dependents (D_h)	11.834 (3.722)	13.862 (5.280)	16.067 (6.537)	5.663[b] (16.235)
Race, nonwhites = 1 (R_h)	-189.229 (15.406)	-149.012 (20.898)	-155.466 (25.771)	-101.560[b] (53.610)
Grade completed (S_h)	26.515 (2.209)	28.968 (3.257)	27.937 (3.998)	26.698 (9.204)
Health limits work = 1 (K_h)	-130.209 (25.535)	-70.637[b] (40.310)	-111.117 (50.486)	-138.997[b] (110.076)
Intercept	1712.247	1716.534	1821.575	1973.913
Summary Information				
R^2	0.133	0.137	0.135	0.194
Standard error of est.	509.480	281.995	470.546	429.258
Mean of dependent variable (L_h)	2174.319	2121.374	2084.357	2068.718
F	83.836	35.449	22.689	6.416
No. of observations	6044	2460	1606	305

[a]The dependent variable is potential hours of work.

[b]Cases in which coefficients are less than twice their standard errors.

Because the New York City sample is relatively small, the standard errors associated with the regression based on it tend to be considerably larger, relative to their coefficients, than the standard errors from similar regressions using larger samples. Thus, one can place somewhat less confidence in the New York City estimates of the effect of wage and income differences on work decisions than in the national or central cities estimates. This is particularly true of the estimated coefficient for accrued nonemployment income. Nevertheless, there is a rather pronounced contrast between the New York City results and those from the basic national sample. The results indicate a somewhat more negative relationship between the wage rate and hours of work in New York City than in the nation as a whole. More striking is the greater negative relationship between nonemployment income in New York City, especially the income flow variant. The results for the central cities and large central cities samples suggest that the difference between New York City and the nation arises because New York is a city and that, even as a city, it is unique.

Before examining more closely the apparent greater sensitivity of New Yorkers to variations in economic incentives, some comment on the control variables is useful. With two exceptions, the signs of the control variables are consistently in the expected direction.[1] Only a limited selection of control variables was included. The relatively large national sample allowed extensive experiments with subgroups permitting complete interaction among the variables, and limiting the selection of control variables reduces the danger of biases arising from simultaneity when the control variables cannot be regarded as exogenous.

Some of the variables among those selected for inclusion cannot, of course, be legitimately regarded as exogenous. Earnings of the spouse and earnings of other family members are the main variables

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[1]The exceptions are age squared and the earnings of others in the New York City regressions. In both cases, however, the coefficients are much small than their standard errors.

for which this is true, although the number of dependents can also in principle be regarded as jointly determined. The two earnings measures can be expected to be positively correlated with the wage rate variables that should in principle be used. Since they also reflect variation in labor supply, however, their inclusion may be a source of bias.[1]

The most important and novel of the control variables is the measure of relative preferences for asset accumulation. The role of the preferences variable is consistent with that expected of a direct measure of relative preferences for asset accumulation. The sign of its coefficient is positive, it appears to be highly significant, and its inclusion has a pronounced effect in the expected direction on the income coefficient. In many cases, in fact, inclusion of the preference measure leads to a change in the sign of the coefficient for nonemployment income from positive to negative.[2]

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[1] In the national study the possible biases were investigated by separate regressions for subgroups of families in which there were only two adults and in which only the husband was a wage earner. This result suggests that the impact of the biases may be small. It should be recognized, however, that regression results for these subclasses may themselves be affected by a sample selection bias.

The estimated coefficients of the two earnings measures were substantially less negative than the nonemployment income coefficients. If these coefficients are interpreted as simply reflecting a cross-substitution effect and an income effect, they imply a less pronounced income effect than do the nonemployment income coefficients. The analysis of the influence of preference differences, however, has not been fully integrated into the family labor supply model. If preference differences for the family have an important influence on labor supply behavior of other family members, as would be expected, the small size of the coefficient estimates may simply be a reflection of this influence.

[2] The empirical evidence on the influence of the preference variable is only briefly discussed in this Report but is presented in considerable detail in Part IV of the national study. Overall, the results suggest that dispersion in preferences for asset accumulation has a marked effect on estimates of the income effect obtained from regressions utilizing disaggregated data. The powerful influence of the preference control variable raises serious questions concerning the reliability of income effect estimates developed from disaggregated data in earlier studies in which dispersion in preferences was not considered. (See Kosters, "Effect of an Income Tax on Labor Supply"; Cohen *et al.*, *A Micro Model of Labor Supply;* and Kalachek and Raines, "Labor Supply of Lower Income Workers."

The labor supply response coefficients in Tables 2 and 3 yield the elasticity estimates reported in Table 4. The wage rate elasticity estimates range from -.14 to -.17. They are similar in magnitude to those in other cross-sectional studies though somewhat smaller than estimates from time-series studies. In part this may be caused by constraints on hours that result from work schedules required for smooth operations in the production process. Over time, normal production schedules should be relatively free of such constraints.

The compensated wage rate elasticity estimates (the estimated substitution elasticities) are all positive and thus consistent with the theory. Because of the relatively large income coefficients associated with the New York City sample, the New York City substitution elasticity estimates are higher than the national estimates. Based on the nonemployment income flows coefficients, in fact, the New York City estimate exceeds the national by almost sixfold. There is much less variance in the estimates based on the accrued measure of nonemployment income.

MEASURES OF NONEMPLOYMENT INCOME

The estimates of labor supply response that have been presented are based on two variants of nonemployment income -- a measure of accrued income from nonemployment sources and a measure of income flows from nonemployment sources. Each of these variables is built up by aggregating income from disparate sources. Estimates of the differential impact of some of the major components of nonemployment income are presented in Tables 5 and 6.

The coefficients reported in the first column are estimates of the impact of the components of nonemployment income not separately analyzed. These components are major durable goods -- housing, property, and automobiles. Coefficients in the remaining columns are estimates of the extent to which the impact on labor supply of these components differs from the coefficient estimate in the first column.[1]

[1] These regressions also included the full set of variables that appear in Tables 2 and 3, although to conserve space they are not presented.

Table 4

ESTIMATED WAGE RATE ELASTICITIES, WAGE RATE AND INCOME COEFFICIENTS, AND SUBSTITUTION ELASTICITIES BASED ON A LINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE[a]

Geographic Group	Wage Rate Coefficient ε^w	Wage Rate Elasticity ε^w	Income Coefficient C^y	Substitution Elasticity[b] ε^s
Accrued Nonemployment Income				
1. Basic male family head sample	-.103	-.141	-.069	.065
2. Households, central cities	-.105	-.145	-.078	.083
3. Households, large central cities	-.112	-.160	-.072	.055
4. Households, New York City	-.113	-.167	-.083	.079
Nonemployment Income Flows				
1. Basic male family head sample	-.108	-.148	-.067	.052
2. Households, central cities	-.113	-.155	-.104	.149
3. Households, large central cities	-.120	-.172	-.101	.130
4. Households, New York City	-.117	-.172	-.160	.301

[a]Elasticities are evaluated at the means pertaining to each sample.

[b]The compensated wage rate elasticity, an estimate of the substitution elasticity, is computed by the formula $\varepsilon^s = \bar{W}(C^w/\bar{L} - C^y)$ where $\bar{W}$ is the mean wage rate, $\bar{L}$ is mean hours of work, and C^w and C^y are wage rate and income coefficients, respectively. $\varepsilon^w = \bar{W}(C^w/\bar{L})$. $\bar{L}$ varies between a high of 2174 hours (for the national sample) and a low of 2069 (for the New York City sample). $\bar{W}$ varies between a high of \$2.98 (for the large central cities sample) and a low of \$2.92 (for the central cities sample).

Table 5

ESTIMATES OF DIFFERENTIAL EFFECTS ON HOURS OF WORK OF THE COMPONENTS OF ACCRUED NONEMPLOYMENT INCOME[a]
(numbers in parentheses are standard errors)

Geographic Group	Accrued Nonemployment Income Coefficient (Y_f^a)	Estimated Differential Effects of Components			
		Consumer Debt (DY_f^a)	Liquid Assets (LY_f^a)	Transfer Payments (TR_f)	Imputed Income From Business or Farm (BY_f^a)
1. Basic male family head sample	-.0478 (.014)	-.1489 (.070)	.0089[b] (.016)[b]	-.0751 (.023)	.0333[b] (.030)[b]
2. Households, central cities	-.0595 (.026)	-.1656[b] (.089)[b]	.0129[b] (.027)[b]	-.0901 (.039)	.133 (.062)
3. Households, large central cities	-.0496[b] (.030)[b]	-.0783[b] (.095)[b]	.0123[b] (.029)[b]	-.1171 (.048)	.3226 (.112)
4. Households, New York City	-.0400[b] (.062)[b]	-2.143 (.606)	.0784[b] (.389)[b]	-.2237[b] (.121)[b]	1.2783 (.518)

[a]Each of the regressions included the set of additional control variables that appeared in Tables 2 and 3.

[b]Cases in which coefficients are less than twice their standard errors.

Table 6

ESTIMATES OF DIFFERENTIAL EFFECTS ON HOURS OF WORK OF THE COMPONENTS OF NONEMPLOYMENT INCOME FLOWS[a]
(numbers in parentheses are standard errors)

Geographic Group	Nonemployment Income Flows Coefficient (Y_f^f)	Estimated Differential Effects of Components		
		Consumer Debt (DY_f^f)	Liquid Assets (ID_f^f)	Transfer Payments (TR_f)
1. Basic male family head sample	-.0262[b] (.015)	-.3560 (.081)	-.0029[b] (.042)	-.0969 (.023)
2. Households, central cities	-.0504[b] (.032)	-.4924 (.135)	.0158[b] (.076)	-.098 (.043)
3. Households, large central cities	-.0451[b] (.036)	-.4164 (.167)	.0224[b] (.087)	-.1216 (.053)
4. Households, New York City	-.0607[b] (.089)	-.2055 (.325)	-.1047[b] (.202)	-.2293[b] (.141)

[a]Each of the regressions included the set of additional control variables that appears in Tables 2 and 3.

[b]Cases in which coefficients are less than twice their standard error.

The negative income stream represented by consumer debt is entered in the regressions as negative nonemployment income, and the estimates usually indicate a significantly stronger negative impact for this component than for the durables component. This is also the case for transfer payments. On the other hand, nonemployment income from a business or farm appears to have a significantly stronger positive influence than income from durable goods. Nonemployment income from liquid assets does not appear to have a significantly different impact on hours of work.

Although the actual impact on hours of work of different sources of nonemployment income may differ, coefficient estimates may differ for other reasons as well. It is possible, for example, that they will differ because the imputations are inexact or the approximations that are used are somewhat inappropriate. The common discount rate that is used to impute income, for example, may not be strictly appropriate, and perhaps it should in principle be varied between classes of assets or even between wealth classes. It is also possible that some components are less appropriately regarded as exogenous. For example, persons with an economic interest in a business or a farm are likely to be working at their business or on their farm at times when others are taking leisure. The transfer payments component could be income or work conditioned, even though the families in which this was most likely to be a factor were excluded from the sample. On the other hand, since the estimates of labor supply response are to be used to assess the influence of transfers on hours of work, it could be argued that particular emphasis should be placed on the income effect estimate resulting from that component. In view of these difficulties of interpretation and the absence of any firm basis for relying more heavily on a component or subset of components of nonemployment income, the main emphasis will be on the overall impact of the measures of nonemployment income.

Although the interpretation of the differential income effect estimates is somewhat obscure, the analysis of them does illustrate the sensitivity of estimated income effects to the manner in which

the nonemployment income variable is constructed and the components included in it. It also suggests a possible explanation for the relatively large income coefficients associated with the New York City regressions. For if nonemployment income components that have a differentially negative impact upon hours of work, such as transfer payments and consumer debt, account for a relatively larger share of nonemployment income in New York City than elsewhere, and those that have a differentially positive impact, such as income from business or farms, account for a smaller share, the New York City result could be attributable to the fact that the variables used to measure nonemployment income in New York City were not the same as those used elsewhere.

A test of this possibility is presented in Table 7. The comparison is limited to the national and the New York City samples, the two samples that provide the greatest contrast. The first column reports on the mean values for nonemployment income. Note that the New York City means are much lower. This is because residents of New York City are less likely to be involved in "forced" savings through the purchase of a home or an automobile than persons who live elsewhere. The next four columns present the percentage share of nonemployment income accounted for by the components reported on in Tables 5 and 6. With one exception, income from transfer payments and debt are relatively more important in New York City than nationally and income from farms and business relatively less important.

The last two columns are estimated coefficients that were obtained by multiplying the percentage share of the components, first (column (6)) by the corresponding regression coefficients that are reported in Tables 5 and 6 for the national sample and then (column (7)) by the regression coefficients associated with the New York City sample. Holding the component coefficients constant, and allowing the percentage contribution of the components to vary (comparing, that is, $\beta^{j,Nat'l}$ to $\beta^{j,NYC}$), provides a crude indication of the impact of the composition of the nonemployment income variables on the estimated nonemployment income coefficients. On the other hand, varying the component coefficients, but holding the percentage contribution of the components

Table 7

A TEST OF THE INFLUENCE OF THE COMPOSITION OF THE NONEMPLOYMENT INCOME VARIABLE ON THE RELATIVE SIZES OF THE ESTIMATED INCOME COEFFICIENTS FOR THE NATIONAL AND THE NEW YORK CITY SAMPLES

Geographic Groups	Mean Nonemployment Income (Y_f) ($)	Percentage Share of Nonemployment Income Contributed by					$\beta^{Nat'l,k}$	$\beta^{NYC,k}$
		Consumer Debt	Liquid Assets	Transfer Payments	Income from Business or Farm			
Accrued Nonemployment Income	(1)	(2)	(3)	(4)	(5)		(6)	(7)
1. Basic male family head sample	$717.7	.052	.106	.181	.037	($\beta^{j,Nat'l}$)	-.061	-.114
4. Households, New York City	415.1	.046	.110	.231	.008	($\beta^{j,NYC}$)	-.061	-.136
Nonemployment Income Flows								
1. Basic male family head sample	398.5	.094	.182	.112	--	($\beta^{j,Nat'l}$)	-.077	-.133
4. Households, New York City	213.7	.130	.195	.179	--	($\beta^{j,NYC}$)	-.092	-.151

$$\beta^{j,k} = \sum_{i=1}^{n} \alpha_i^j \gamma_i^k + \mu^j ,$$

where α is an estimated coefficient of the differential effect of a component of nonemployment income, γ is the percentage share of nonemployment income contributed by a component of nonemployment income, μ is the estimated coefficient of the impact of nonemployment income components not separately analyzed, the subscript i indicates the component (i.e., i = debt, liquid assets, ...), the superscript j indicates the coefficients (i.e., j = coefficients from the national sample, coefficients from the New York City sample) and the superscript k indicates the share percentages (i.e., k = national share percentages, New York City share percentages).

constant (comparing, that is $\beta^{Nat'l,k}$ to $\beta^{NYC,k}$), provides a measure of differences between the New York City and the national nonemployment income coefficients that are not attributable to differences in the composition of the measures of nonemployment income. The results in the last two columns of Table 7 indicate that geographic differences in the composition of nonemployment income variables make a rather minor contribution to the relatively large differences in income coefficients for New York City and the nation.

A FURTHER TEST OF THE DIFFERENTIAL RESPONSE OF NEW YORKERS TO NONEMPLOYMENT INCOME

So far, the comparison of the labor force behavior of New Yorkers with others has been based on contrasting coefficients in regressions using different geographic groups. Because of the importance of the rather substantial difference in the national and New York City nonemployment income coefficients, a more rigorous test appears warranted.

A single variable was added to the national regressions that are reported in Tables 2 and 3. The variable is an interaction term that is calculated by multiplying a dummy variable, which equaled one for New York City residents and zero otherwise, times the nonemployment income variable. The coefficient of this variable (see Table 8) is an estimate of the extent to which the relation between nonemployment income and hours of work for New Yorkers differs from that for the rest of the nation. Two different versions of the relative preference variable are utilized. The first uses the asset holdings regression which is based on the national sample to construct the preference variable. The second uses the national asset holdings regression to construct the preference variable for nonresidents of New York City, but utilizes the asset holdings regression for the New York City sample to construct the preference measure for New Yorkers.

The signs of the differential income coefficients for New Yorkers are all negative and therefore are consistent with the possibility that the labor supplied by New Yorkers is relatively more sensitive to variations in nonemployment income. The magnitude of the differential

Table 8

ESTIMATES OF A DIFFERENTIAL RELATIONSHIP BETWEEN HOURS OF WORK AND NONEMPLOYMENT INCOME FOR RESIDENTS OF NEW YORK CITY[a]
(numbers in parentheses below coefficients are standard errors)

Basic National Male Family Head Sample	Income Coefficient	Differential Income Coefficient for New Yorkers	Wage Rate Coefficient	Preference Variable Coefficient	Intercept	R^2	Substitution Elasticity for Non-Residents of NYC[b]	Substitution Elasticity for NYC Residents[b]
Accrued Nonemployment Income								
Preference variable for New Yorkers								
Constructed from national asset holdings regression	-0.069 (0.010)	-0.028 (0.033)[c]	-103.109 (4.774)	553.016 (56.818)	1638.244	0.134	.057	.140
Constructed from New York City asset holdings regression	-0.067 (0.010)	-0.047 (0.033)[c]	-103.058 (4.779)	543.706 (56.417)	1639.301	0.133	.051	.190
Nonemployment Income Flows								
Preference variable for New Yorkers								
Constructed from national asset holdings regression	-0.066 (0.011)	-0.074 (0.052)[c]	-108.276 (4.634)	372.826 (39.721)	1711.593	0.133	.041	.260
Constructed from New York City asset holdings regression	-0.065 (0.011)	-0.091 (0.052)[c]	-108.175 (4.636)	370.380 (39.649)	1710.732	0.133	.038	.307

[a] Each of the regressions included the set of additional control variables that appears in Tables 2 and 3.

[b] The compensated wage rate elasticity, an estimate of the substitution elasticity, is computed by the formula $\epsilon^s = \bar{W}(C^w/\bar{L}-C^y)$, where $\bar{L}$ is the mean hours of work, $\bar{W}$ is the mean wage rate, and C^w and C^y are wage rate and income coefficients respectively. To estimate the substitution elasticity for New York City residents C^y is set equal to the algebraic sum of the "income coefficient" and the "differential income coefficient for New Yorkers" (i.e., the sum of the first two columns). To estimate the substitution elasticity for non-residents C^y is set equal to only the income coefficient (i.e., the first column alone). To ensure comparability the elasticities are evaluated at the means pertinent to the New York City sample.

[c] Case in which the coefficient is less than twice the size of the standard error.

coefficients also tend to be rather large. And as a result substitution elasticity estimates for New Yorkers (see the last column) are considerably larger than comparable estimates for nonresidents (see the second from the last column). However, although the differential income coefficient is larger than its standard error in three of the four reported regressions, in no case is it as great as twice as large. Thus, the evidence indicates a greater response by New Yorkers to variations in nonemployment income, but the evidence must be regarded as weak and nonconclusive.

DEMOGRAPHIC SUBGROUPS

Different demographic groups may have differential labor supply responses. If there are differential responses, this should be taken into account in making inferences about the impact of various income maintenance programs. Furthermore, if the demographic composition of the New York City population differs from that of the rest of the nation, a differential labor supply response by certain demographic groups may cause a differential response by New Yorkers.

Table 9 indicates four common measures for comparing demographic composition of the national and New York City samples. The table

Table 9

SOME SELECTED CHARACTERISTICS OF THE
NEW YORK CITY AND THE NATIONAL SAMPLES

	Basic National Male Family Head Sample	New York City Sample
Mean age	39.3	39.1
Percentage of nonwhites	31.2	42.0
Average school grade completed	10.6	10.3
Average family size	4.3	3.9

indicates that the two samples are very similar with respect to age and education but that there are substantial differences in family size and racial composition.[1]

Since the racial composition of the New York City and national populations differ, a comparison of the labor force behavior of Negroes and whites would seem to be an obvious place to begin a discussion of differential labor supply responses. The simplest comparisons appear to suggest a significantly weaker response of hours of work for Negroes to the accrued nonemployment income variable. Taking the national sample of Negroes separately results in smaller and less significant income effect estimates than in the overall national sample.[2] (Interestingly, for the flow version of nonemployment income the estimates for Negroes are similar to those for the overall sample.) A closer inspection of results for the accrued version for Negroes and whites gives rise to a suspicion that factors other than differential labor supply response may be at work. When the behavior of Negroes in poor and nonpoor areas of the central cities of SMSAs is compared with that of their white counterparts, for example, the income effect appears to be at least as strong for Negroes. Whites and Negroes in poor areas in the rural South also show little evidence of differential response.

These results indicate that simply stratifying by color may yield misleading evidence on differential response, perhaps because the samples differ substantially with respect to variables other than color. The relative preferences variable also appears to be a factor affecting income effect estimates for subgroups. Measurement of relative preferences for the poor, for Negroes, and for persons with low

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[1]Unfortunately, persons with Spanish surnames, such as Puerto Ricans, are not separately identified in the SEO file. Most appear to be included in the white category.

[2]Because of the rather small size of the New York City sample, the analysis in this section will be based on comparisons of demographic subgroups of the national sample. (The regressions for these demographic groups are presented in Appendix B of the national study.) It is felt that differences between demographic groups in behavior that are found at the national level are also likely to exist within New York City.

socioeconomic status may be particularly imprecise because variation in measured asset holdings for these groups is more likely to be transitory or random. Estimation of normal asset holdings would thus have less meaning, and deviations from normal asset holding ratios would contain less information on relative preferences. The nonemployment income measure would, of course, also suffer from these deficiencies.

In addition to being composed of a higher proportion of nonwhites than the national sample, the New York City sample tends to be made up of smaller families. Separate regressions for various family structures, however, failed to indicate any systematic relationship between family size and labor supply behavior.

Whether labor supply response differs for families that would be eligible for income maintenance programs because of their income levels is also an important question. Direct investigation of this question, by separately analyzing a low income subgroup, can result in seriously misleading results. Stratification by relatively narrow income intervals forces a strong negative relation between hours of work and the wage rate simply because variation in hours offsetting that in wages is the only pattern consistent with a narrow income interval, apart from variation in income from sources other than earnings of the head. This pattern is evident in regressions for low income subgroups. Thus, the simulations of labor supply responses to income maintenance programs are based on regressions run on a data set that includes families with earnings up to $15,000.

Regressions for separate age categories suggest that there may be a tendency for a more pronounced income effect for young workers (family heads under 25). This may reflect a broader range of prominent alternatives to work for young workers, such as investment in education. A smaller income effect is suggested by estimates for older workers (over 55), but this may result from the fact that the method used to construct a measure of relative preferences is conceptually less appropriate for this age class. The treatment of nonemployment income streams is strictly applicable for workers with infinitely long working lives, and this approximation, while not a serious oversimplification

for young and middle-aged workers, becomes increasingly inappropriate as older workers are considered.

The problems that accompany the interpretation of estimates obtained by stratifying the sample in various ways and separately analyzing labor supply response raise the issue of the extent to which differing estimates for different population groups reflect different underlying patterns of labor supply response and the extent to which they are due to differences in other factors. The overall evidence gives no firm basis for concluding that there are important differences in labor supply response, except perhaps for relatively young workers. I have taken the view, therefore, that estimates from samples that are broadly representative of the population are preferable to those obtained from subgroups for the analysis of the impact on labor supply of income maintenance programs.

I have also not been able to find any evidence that the relatively large regression coefficients for nonemployment income, which are associated with the New York City sample, are attributable to any peculiarities in the sample's demographic composition. It is possible, however, that more subtle demographic differences, that could not be investigated within the scope of this study, might account for some of the difference between the New York City and the national coefficients. The difference might also be associated with living conditions that are somewhat peculiar to New York City. It is possible, for example, that the work ethic has eroded more in New York City than elsewhere. Subsidies appear to be more readily obtainable by low income residents of New York City than by families in other locations. It also seems possible that New Yorkers have a relatively short time horizon. This is implied by the fact that the regressions using the flow version of nonemployment income show a greater divergence between New York City and the nation than do the regressions utilizing the accrual version. A relatively short time horizon would indicate that, compared with nonresidents, New Yorkers are especially likely to purchase leisure with nonemployment income. Another possibility can be traced to the "wedge" that the cost of getting to the work place drives between

the marginal return from wage income and the marginal return from nonemployment income. Since this cost (at least in terms of time) appears to be especially high in New York City, the return to a dollar of nonemployment income relative to a dollar of wage income would seem to be especially great in New York City.

CURVILINEARITY IN THE WAGE RELATION

A variety of experiments with different specifications of the regression equations indicated that it is difficult to discriminate among alternative functional forms. Experiments with logarithmic equations were hampered because both the relative preferences measure and the nonemployment income variable take on negative values for some persons in our sample. Experiments designed to explore curvilinearity in the effect of nonemployment income on hours of work failed to show consistent or statistically significant evidence that the relation should not be regarded as linear.

The results did provide some evidence of curvilinearity in the relation between hours of work and the wage rate. The evidence is consistent with a backward-bending labor supply function, although the effect is much less pronounced than might be expected, and a positive relation was not obtained even at very low wage levels. The strongest statistical evidence of substantial curvilinearity in the wage relationship was associated with the national sample. Experiments allowing the labor supply function to be represented by a series of linear segments indicated that a kink occurred in the supply function at about the $2 per hour wage level (see Table 10). Evidence of a tendency toward a backward-bending supply function for married males in New York City is much weaker. There was no evidence of a kink in the supply curve, for example. When wages enter the New York City regressions in a quadratic form (wages plus wages squared) there is some suggestion of curvilinearity in the expected direction.[1] The coefficient for wages squared,

[1]Results for the two central cities samples (not shown) were very similar to those for New York City.

Table 10

ESTIMATED WAGE RATE COEFFICIENTS FOR A NONLINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE AND INCOME COEFFICIENTS[a]
(numbers in parentheses below coefficients are standard errors)

Demographic Group	Wage Rate Coefficient (W_h)	Slope Adjustment Coefficient for Wages Greater than $2/ Hr. ($W_h^o$)	Wages Squared Coefficient (W^2_h)	Income Coefficient (Y_f)	R^2
Accrued Nonemployment Income					
1. Basic male family head sample	-72.14 (13.82)	-26.65 (11.13)	--	-.0674 (.010)	.134
4. Households, New York City	-57.52 (49.34)[b]	--	-3.12 (2.59)[b]	-.1155[b] (.059)[b]	.188
Nonemployment Income Flows					
1. Basic male family head sample	-73.69 (13.83)	-29.56 (11.11)	--	-.0662 (.011)	.134
4. Households, New York City	-109.87 (42.53)	--	-0.80 (2.32)[b]	-.165 (.066)	.192

[a]Each of the regressions included the set of additional control variables that appears in Tables 2 and 3.

[b]Cases in which coefficients are less than twice their standard error.

however, is small relative to the wage coefficient and relative to its own standard error.

Since it is implausible that a supply curve really remains negative at very low wage levels, it is pertinent to ask why the statistical evidence from the New York City sample implies such a weak tendency toward backward-bending. One reason is that the statistical relationship between hours and wages is not strong enough to allow precise discrimination among functional forms. This is particularly true of the lower wage levels, where there are very few observations. Only about 11 percent of the 305 members of the New York City sample received wages that were under $2.00; and only 2 percent had wages that were under $1.50. A related problem may result from calculating the wage rate by dividing weekly earnings by weekly hours, for it would seem that exceptionally low (or high) wage rates are especially likely to be associated with errors in the hours of work recorded in the SEO file. And since weekly hours is a component of the dependent variable, a strong negative bias at low wage levels could result.

Similar problems are likely to be associated with the national sample. Nevertheless, this sample provides a much greater number of low wage observations than the New York City sample. For this reason, I feel that the results associated with the national sample are likely to be more indicative of the actual shape of the functional relation between hours and wages. Estimates of income-compensated wage elasticities at selected points on the segmented supply function that was estimated for the national sample are:[1]

	Wage Rate Less than $2/hr	Wage Rate over $2/hr	Wage Rate at Sample Mean
Estimates for accrued nonemployment income	.068	.043	.064
Estimates for nonemployment income flows	.064	.037	.055

[1]Elasticities below and above $2/hr are evaluated at $2/hr and mean hours using wage coefficients applicable below and above $2/hr. Estimates at sample mean use both mean hours and wages, and wage coefficients applicable above $2/hr.

Computing elasticities in the neighborhood of the kink and at the sample mean for wages gives rise to compensated wage rate elasticity estimates that increase up to the $2 level, decline abruptly, and increase at wages above $2 per hour. At the mean wage level they are approximately the same size as just below $2 per hour. Although the wage relation was approximated by linear segments, the statistical evidence is interpreted as indicating a tendency toward a less pronounced wage rate effect at low wage levels, rather than regarding as significant the kink and the precise wage level at which it occurs. This interpretation leads me to regard the compensated wage rate elasticity as approximately constant, at least for wage levels below the mean. Thus, for the simulations of labor supply responses to income maintenance programs, the estimates of the compensated wage rate effect and the income effect for relatively low wage workers will both be regarded as constant.

APPRAISAL OF THE RESULTS

In the light of the discussion above and the evidence presented in the tables, the question that arises is: What should be regarded as reasonable estimates of the income effect and income-compensated wage rate effect for the purpose of analyzing the effects of income maintenance programs with differing income guarantee levels and implicit tax rates? First I shall briefly discuss the selection of the estimates that were used in the national paper. Then I shall summarize the reasons why the estimates used here diverge somewhat from the national estimates.

In choosing the national estimates, not only were regression results for the basic national sample of male family heads utilized, but also regression results (not presented here) for important subgroups of observations from the national sample.[1] In addition, there

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[1] In addition to the basic national sample, the national paper focused on the five following demographic groups:

(1). The portion of the basic male family head sample from the SEO file that is based on the CPS sample frame. This sample is self-weighting.

was an attempt to take presumptive biases in the regression estimates into account.

Three major sources of possible bias were identified. The first results from the manner in which the wage rate is computed. Since the wage rate is computed by dividing earnings by hours of work, and the hours variable is a component of the dependent variable, there is strong presumption that some negative bias in estimates of the wage rate coefficient occurs. The second bias results from a presumption that differences in relative preferences for asset accumulation are only imperfectly controlled. Given the strong influence of the preferences variable on income effect estimates, it seems likely that the income effect is more pronounced than the estimates indicate. The third factor is that the nonemployment income variable is likely to be subject to considerable measurement error, and a bias toward zero in the income effect estimate would be expected.[1] Bias from the first source would affect only estimates of the compensated wage rate effect, while bias from the other two sources affects both income and substitution effect estimates. All three of the biases, however, operate in the same direction; they suggest that the magnitude of both income and substitution effects is likely to be larger than the estimates obtained.

On the basis of the regression evidence and judgment on the most likely character of the biases, the following three sets of estimates

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(2). Interview units in the basic sample in which only two persons -- the husband and his spouse -- were 18 years old and over.

(3). Interview units in the basic sample in which the only member with earned income in 1966 was the husband.

(4). Interview units from the basic sample with children or relatives less than 18 years old present.

(5). Interview units from the basic sample excluding those in which the husband was in an institution, in the Armed Forces, or unable to work (ill or disabled) during part of the year in 1966.

[1]The measures of nonemployment income that are used are, of course, only approximations of the conceptually appropriate measure. Although this is an additional source of possible bias, neither the sign nor the magnitude of bias from this source can be identified with any confidence.

of income and substitution effects were selected for use in the national analysis of labor supply responses to alternative income maintenance programs:

	Substitution Effect	Income Effect
Low estimate	.10	-.09
Intermediate estimate	.20	-.10
High estimate	.25	-.11

For at least two reasons, the sets of estimates selected for the nation as a whole do not seem entirely appropriate for New York City. First, the standard errors for New York City are larger relative to the regression coefficients than for the nation as a whole. This suggests that a somewhat wider range of estimates than the one presented above should be used in this study. Second, there is some indication that the work effort of New Yorkers would be exceptionally responsive to the extension of income maintenance programs to poor working males. Although this evidence is admittedly not conclusive, it seems reasonable to take some account of it.

Based on the assembled evidence, the following two pairs of substitution and income effects appear to encompass the range of plausible estimates for New York City:

	Substitution Effect	Income Effect
Low New York City estimate	.08	-.08
High New York City estimate	.30	-.16

Note that these are the sets of estimates presented for New York City in Table 4. The low estimates are based on a regression that uses the accrued version of nonemployment income, while the high estimates are from a regression that uses the flow version. The two sets of estimates fully encompass the three pairs of national estimates presented above, thereby reflecting our rather tenuous knowledge of the labor force behavior of New Yorkers. The low estimates represent, in my judgment, the minimum response that can be inferred from the statistical evidence and some knowledge of the statistical biases. The high estimates are

consistent with somewhat more pronounced income and substitution effects for New Yorkers than for the rest of the nation. The regression results for the nation and for New York City indicate, in my judgment, that the labor supply response of New Yorkers is more likely to be near the high end of the range than the low end.

VI. THE SIMULATIONS

The possibility of designing income maintenance programs that offer inducements to work to families who are eligible for income supplements, while promoting equity between those who work and those who do not, is regarded as one of the primary advantages of the negative income tax approach. Implementing a program of this nature involves a restructuring of work incentives, both for those families currently receiving welfare payments and for families not previously covered by income maintenance programs. The incentive to increase family income by obtaining employment or increasing work effort will be strengthened for those currently receiving welfare if introduction of the program results in lower implicit tax rates on earnings at given income levels. Extension of the program to families not previously covered, on the other hand, will result in some weakening of their work incentives.

Although this study is chiefly concerned with families not hitherto receiving income supplements, a realistic overall assessment of the impact of income maintenance programs should also take into account changes in work patterns for families currently receiving welfare payments. If incentives to work are considerably strengthened relative to current welfare programs, these families can be expected to increase the degree to which they raise their incomes through earnings. The beneficial effects of restructured incentives are likely to become particularly evident over time as incentives for family dissolution are reduced and because such programs facilitate mobility from reliance on income supplements to employment whenever family circumstances permit. Although improvements in incomes and employment expected to result from restructured incentives for current welfare recipients are difficult to estimate and are not estimated in this study, they should not be overlooked in any assessment of the overall impact of income maintenance programs.

The analysis focuses on the impact of income maintenance programs on families constituting the main group to which income supplements

would be extended under current proposals. The simulations of the impact of alternative programs that are presented in this section take into account, therefore, the principal segment of New Yorkers whose work incentives would be adversely affected. The simulation results reflect changes in earnings and program costs due to adjustments of hours of work of male heads of families who live in New York City as well as the influence of these estimated work adjustments on program eligibility.

In the first part of this section I discuss the method used to determine family eligibility for program participation and describe the manner in which labor supply adjustments, earnings and income changes, and program costs are estimated. The program designs that are analyzed are discussed in the second part. In the last part of the section, a variety of summary measures of the impact of alternative programs are presented.

METHODOLOGY

To examine the impact of a negative income tax program on work effort, the families who are likely to participate must first be identified. The method for determining eligibility for participation that is used in this study can be described in terms of Figure 2, the diagram conventionally used to analyze work-leisure choices. In the absence of a negative income tax program, the line XY represents the family's budget constraint.[1] Given the family's preference map, equilibrium occurs at the point P^* on indifference curve U_1. The family receives Y^* dollars of income from the husband's earnings and he supplies H^* hours of work.

Introduction of a negative income tax program can be represented by a new budget constraint such as GBY, where the family receives an

[1] For simplicity in the diagrammatic exposition, earnings of the male head is the only component of family income considered since the analysis takes into account only his labor supply response. Other components of family income are, of course, included in the simulation without allowing for labor supply changes by other family member.

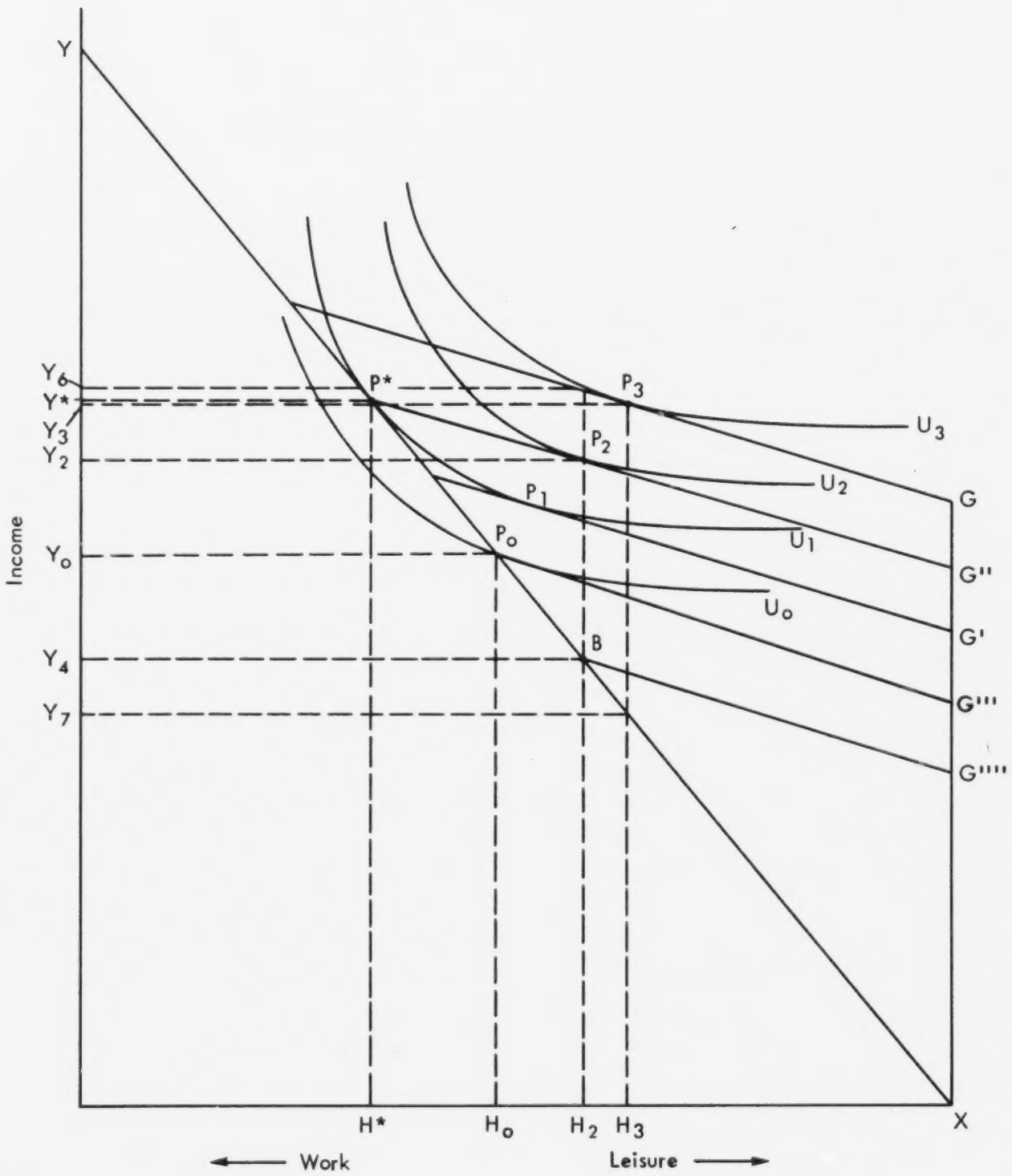

Fig. 2 -- Work-leisure choices under a negative income tax

income guarantee of G, and a percentage of each dollar of earnings, t, is simultaneously taxed away. The analysis of whether a family will choose to participate can be carried out most simply by considering only a single preference map and implicit tax rate and varying the level of the income guarantee. This approach corresponds analytically to considering the responses to a given program of families with the same preferences and wage rates of the head, but different numbers of dependent children. A family will choose to participate in the program if it can attain a higher indifference curve under the program than U_1 attained at P^*. Thus at the income guarantee level G′, a family will be indifferent; it will choose to participate at higher levels but at levels below G′ it will not.

The constant utility criterion can only be approximated in practice, and consequently lower and upper bounds for participation were established. Under the procedure for estimating lower bounds for the number of participating families, participation is definitely advantageous to the family, and families qualifying under this procedure can be regarded as "definite participants." Families who are not definite participants but who qualify under the procedure for establishing upper bounds can be regarded as "possible participants" since there is no way of determining what proportion of them would actually find participation advantageous. Families ineligible under the upper bound procedure would definitely not find it advantageous to participate and they can be regarded as "definite nonparticipants."

Definite participation does not require that the family's income after it chooses to participate be at least as high as its income before introduction of the program. Since the tax rate on earnings under the program reduces the relative price of leisure, a family may find it advantageous to reduce hours of work in response to the incentives created by the program because it values the additional leisure more highly than the income forgone. Such an outcome is depicted in the diagram at income guarantee level G″, where the reduction in hours to H_2 and the income decline to Y_2 leads to attainment of the higher indifference curve U_2. Since the budget line associated with G″ passes

through P^*, the family is at least as well off with the program as without, and it will definitely participate. At any guarantee level below G'', it is impossible to be certain that the family could attain a higher indifference curve. Thus whenever income under the program at H^* hours of work would be at least as high as family income in the absence of the program, the family will definitely participate. The procedure involving this comparison establishes a lower bound for the number of potential program participants.

Although families who would definitely be participants in a program can be identified without an explicit consideration of the hours of work adjustments that would occur under the program, it is necessary to analyze hours of work adjustments to distinguish possible participants from definite nonparticipants and thus establish an upper bound. Under the program represented by the budget constraint $G''P^*Y$, the subsidy payments from the program are just sufficient, at H^* hours of work, to compensate the family for earnings lost through imposition of the implicit tax rate, t. The response of hours of work in this case is analytically equivalent to the manner in which the income-compensated wage rate effect was estimated. Under income guarantee level G'', therefore, initial hours of work would be reduced by an amount equal to $\varepsilon^s tH^*$, where ε^s is the income-compensated wage rate elasticity. Hours of work after adjustment in response to the tax rate, H_2, are thus equal to $H^*(1 - \varepsilon^s t)$.

At the point P_2, however, a higher indifference curve is attained than at P^*. The income guarantee could be reduced, consequently, with participation in the program remaining advantageous to the family. As lower guarantees are considered, hours of work are increased through the income effect; they are increased from H_2 by C^y for each dollar of income that the guarantee level is reduced below G''. The income effect response of hours of work that is traced out as lower levels of the guarantee are considered passes through P_1 (at income guarantee G', a level that cannot be determined without precise knowledge about the shape of the indifference curve), and it finally passes through P_o at the intersection of the original budget constraint XY and the

constraint under the program with income guarantee level G'''. At the point P_o, income under the program at H_o hours is equal to income in the absence of the program at those hours. With any further reduction in the income guarantee level below G''', the family could definitely attain a higher indifference curve by not participating in the program. At any level above G''' (but below G''), on the other hand, it is impossible to be certain that the family could attain a higher indifference curve without participating. Thus, comparison of family income under the program at H_o hours of work with income in the absence of the program at H_o, allows a distinction between possible participants and definite nonparticipants and establishes an upper bound for the number of participating families.

In the simulation, the lower bound was established as outlined above. As a result of an oversight when the simulation procedure was programmed, the income effect was not taken into account in estimating the upper bound. Consequently, the upper bound estimates (presented in Appendix B) correspond to the point B under income guarantee level G''''. The procedure under which these upper bound estimates were obtained involved a comparison of income under the program at H_2 hours of work with income in the absence of the program at the same hours. The upper bound estimates, therefore, include some families that should appropriately be regarded as definite nonparticipants.

When the participants under a given program have been identified, their labor supply adjustments can be estimated. As noted above, the hours adjustment resulting from the substitution response to the tax rate, ΔH^s, is $\varepsilon^s t H^*$. The hours response through the income effect can be analyzed if one considers a guarantee level such as G. The income that would be attained under the program at H_2 hours of work is, in this case, in excess of the amount needed to compensate for the earnings loss implied by the tax rate by the amount $(Y_6 - Y_2)$ when the impact of the program is estimated by considering only definite participants. The additional reduction in hours resulting from the income effect, ΔH^y, is $(H_2 - H_3)$. It is estimated as the product of the income coefficient, C^y, and the income change $(Y_6 - Y_2)$. The

total adjustment in work effort resulting from the program, ΔH^t, is obtained by adding the hours adjustments from each source (that is, $\Delta H^t = \Delta H^s + \Delta H^y$).

When hours adjustments are considered under the procedure for establishing upper bounds, the substitution component is estimated as indicated above. For guarantee levels above G″ the income effect is also computed in the same way. For guarantee levels between G″ and G‴, on the other hand, income is less than sufficient to compensate for the imposition of the tax. Families facing guarantee levels in that range -- possible participants -- would as a result be subject to a work-inducing income effect. The income effect for families choosing to participate at income guarantee level G‴ should, therefore, be computed by using the income difference $(Y_o - Y_2)$. Under the upper bound procedure actually used the hours adjustments (reported in Appendix B) use the income difference $(Y_6 - Y_4)$, and hours reductions are consequently overestimated by $(H_2 - H_o)$.

The magnitude of reductions in hours of work by program participants is itself of considerable interest because attitudes toward the program and participants are likely to be strongly affected by the program's impact on work patterns of the poor. But it is also important to consider the loss in the production of goods and services that these hours reductions entail. The reduction in earnings generated by hours adjustments for each family is $\Delta H^t \cdot W$, where W is the wage rate of the family head.[1] Under competitive conditions the worker's wage is equal to the value of his marginal product, so this measure can be regarded as an estimate of the direct production loss occasioned by the program.

The direct production loss does not, however, represent a net loss to society resulting from the program. Families under the program receive additional leisure, and the value they place on that leisure

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[1]The income loss to the family from the hours adjustments is only $\Delta H^t \cdot W(1 - t)$; the difference between the earnings reduction and the income loss is a component of the subsidy under the negative income tax program.

is an important offset to the production loss.[1] There is, however, a net loss to society that results from the inability of program participants to obtain the full value to society of the output that could be produced by additional work. The tax rate applicable to earnings creates a gap between the amount consumers are willing to pay for the production achieved through an hour of work and the net return to a participant for giving up an hour of leisure. This net loss to society, the welfare cost or "deadweight loss," is a consequence of the resource misallocation represented by a socially nonoptimal division of participants' time between work and leisure. It is a measure of the value a family would place on the opportunity to make the husband's work-leisure choice in response to the market tradeoff between income and leisure instead of the tradeoff resulting from the tax rate.[2]

The amount of the subsidy, after hours adjustments have been taken into account, is of course of great interest for assessing the costs of the program. At guarantee level G, the amount of the subsidy is $(Y_3 - Y_7)$, the family's income after hours adjustments less what would have been earned in the absence of the program at H_3 hours of work. Since part of the subsidy will in general be used to purchase leisure, the difference between initial income, Y^*, and income under the program, Y_3, will be less than the amount of the subsidy. It can in fact be negative (as shown in Figure 2).

THE PROGRAMS

Although numerous variations on the negative income tax concept have been propounded, the simulations for this Report are concentrated

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[1] Nonparticipants who pay the additional taxes required to support the program will presumably, on balance, increase their work effort resulting in a production gain offset by a reduction in leisure for them.

[2] Welfare cost was estimated using the formula:

$$\text{Welfare cost} = 1/2\ HW\varepsilon^s t^2.$$

For a detailed exposition and derivation, see Arnold C. Harberger, "Taxation, Resource Allocation, and Welfare," *The Role of Direct and Indirect Taxes in the Federal Revenue System*, Princeton University Press, Princeton, 1964, pp. 25-70.

on two proposals that have recently received serious discussion: President Nixon's Family Assistance Plan (FAP) and the recommendations of the President's Commission on Income Maintenance Programs (PC). The sensitivity of these programs to the addition of state or city supplementation is also examined.

FAP provides a guarantee of $500 for each of the first two family members and $300 for each additional member. To qualify for FAP at least one family member must be a dependent child under 18 (21 if a full-time student); and the family's net assets (excluding their home, household goods, personal effects and property essential to their self-support) cannot exceed $1500. Income is to be taxed at 50 percent. The following income components, however, are tax exempt: the first $720 of earned income; "irregularly" earned and unearned income up to $30 per quarter of each type; earnings of a child in school; training allowances; scholarships and fellowships; earnings used to pay for child care; food stamps; public and private charity; and produce grown at home.[1]

Since FAP has been grafted directly to the existing food stamp program (FSP), it is important that the simulations be based on the combined program (FAP-FSP), rather than on FAP alone. The food stamps component of FAP-FSP annually guarantees $296.04 worth of food stamps to each family, plus an additional $183.60 of food stamps for each person in the family. It taxes a family's income -- including any subsidies received under FAP -- at 18.05 percent.[2]

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[1]The preceding is based on the version of FAP passed by the House of Representatives and reported in the *Congressional Record*, April 16, 1970, pp. H 3173 - H 3175; H 3209 - H 3220. At the time the simulations were performed, FAP had not yet passed the Senate. The version of FAP that finally emerges, if one does, could differ considerably from the one reported here.

[2]The value of the food stamp subsidy (FSR) is determined on the basis of a rather complex schedule to a family's size (N) and monthly income (MI). Using the schedule as the source of data points in a regression, the following estimates of the monthly guarantee level and of the implicit tax rate were obtained:

$$FSR = 24.67 + 15.30\ N - .1805\ MI$$
$$\qquad\qquad (.3739) \quad (.0054)$$

(standard errors are in parentheses.) Standard error of estimate = $4.8; $R^2 = .95$; Number of observations = 95.

The plan recommended by the President's Commission on Income Maintenance Programs is comparatively simple. The plan proposes a guarantee of $750 for each of the first two adults in a family and $450 for each additional family member. All income, earned and non-earned, is to be taxed at a 50 percent rate. In addition, 10 percent of the value of net assets (other than personal effects and furnishings) are to be taxed at the 50 percent rate.

Before a new welfare payments schedule can be introduced, a decision must be made on what is to become of the existing state welfare schedules. There are at least three alternative approaches. (1) Existing standards could be entirely superseded by the new payment schedule. (2) Payments to those who are currently eligible for welfare could be based on whichever schedule pays the greater benefits. (3) Payments to those who are newly eligible, as well as to the currently eligible, could be based on whichever schedule pays the greater benefits. Resolution of this issue is of particular importance in New York City, where current payment levels are considerably higher than those provided by either the Administration's program or the President's Commission's program. The first alternative would leave most current New York City welfare recipients worse off. The second alternative would result in a substantial inequity between the currently eligible and the newly eligible. It also would retain much of the incentive in the present welfare system for family dissolution. The third alternative is expensive and would accentuate the existing payments differentials between New York and most other parts of the country.

In their recommendations, both the Administration and the President's Commission have, in general, opted for the second alternative. As a result it seems unlikely that states will be required to supplement federal subsidy payments to families headed by working males, the group with which we are concerned. On the other hand, state supplementation is not precluded. And since the absence of supplementation would result in a substantial inequality and would produce an incentive to working poor males either to desert their families or to become nonworkers, it seems likely that some sort of state supplement (SS) for families headed by working males will eventually be forthcoming.

If New York does ultimately extend state supplements to families headed by working males, the procedures utilized will probably be similar to those recommended by the Administration for families that are currently eligible for welfare. Under the Administration's proposals, families that are eligible for state supplements qualify for an income guarantee that is approximated by the following schedule:[1]

Family Size	Annual Guarantee
2	$3092.04
3	3636.00
4	4260.00
5	4915.20
6	5455.20
7	6014.40
8	6554.40
9	7115.16
10	7679.16

(For families of more than 10 persons, add $540 for each additional member.)

State supplement recipients would also face marginal tax rates that are higher than the 50 percent rate recommended for both FAP and PC. Taxable earnings that do not exceed the FAP (or PC) breakeven point[2] would be taxed at a two-thirds rate; taxable earnings in excess of the breakeven point would be taxed at a four-fifths rate. Nonearned income would be taxed at 100 percent.

Because it seemed useful to attempt to estimate the <u>incremental</u> impact of extending state supplement payments to working poor male heads of households, the simulation was conducted by alternatively

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[1] I am very indebted to Clara Friedman for providing the information used to derive the schedule. The schedule was calculated from the current simplified public assistance schedules for New York City. The basic "semi-monthly allowance schedule" and the "semi-monthly schedule for fuel for heat" were annualized and summed together with an estimate of the reimbursement for rental purposes. The latter was assumed equal to $1320 ($110 per month), an amount Dr. Friedman felt approximated the average welfare payment to cover rental expenses.

[2] For these purposes, the FAP breakeven point equals twice the FAP guarantee plus $720; the PC breakeven point equals twice the PC guarantee.

assuming that the members of the New York sample would and would not be eligible for state supplements. Thus, four program "packages," three of which incorporate more than one "component program," are analyzed:

I. The Family Assistance-Food Stamp Package (FAP-FSP)
II. The recommendations of the President's Commission on Income Maintenance Programs (PC)
III. The Family Assistance-Food Stamp-State Supplement Package (FAP-FSP-SS)
IV. The President's Commission-State Supplement Package (PC-SS).

The simulation of multi-component packages is complicated by the fact that some families can maximize their incomes by not participating in every program component. Because of the relatively low tax rate associated with food stamps, for example, it would pay some families to participate in the food stamp segment of FAP-FSP, but not in the family assistance component. Table 11 presents the alternatives that are available under each of the program packages, including the possibility of not participating in any of the component programs (NP). Alternatives that would not be selected by any members of the sample are noted.

Except for small differences that are described in Appendix A, the sample used for the simulation is similar to the one used in the regressions. Although the regressions were run with an unweighted sample, the simulation utilizes the "person sample weights" provided in the SEO file. These weights account for certain types of persons having a higher probability than others of being included in the original SEO sample and of being interviewed.

To carry out the simulation pre- and post-program budget equations must be defined. These equations approximate the programs described above as closely as the data and a reasonable interpretation of program provisions permit.[1] Program packages and component programs are

[1]Considerable administrative discretion is allowed under FAP. How, for example, will the provision exempting $30 of "irregularly"

Table 11

ALTERNATIVES UNDER FOUR DIFFERENT PROGRAM PACKAGES[a]

I FAP-FSP	II PC	III FAP-FSP-SS	IV PC-SS
NP	NP	NP	NP
FAP+FSP	PC	FAP+FSP+SS	PC+SS
FAP[b]		FAP+FSP[b]	PC[b]
FSP		FAP+SS	SS
		FSP+SS	
		FAP[b]	
		FSP[b]	
		SS	

[a]FAP: Family Assistance Plan.
FSP: Food Stamp Program.
PC: President's Commission's Program.
SS: State Supplement Program.
NP: No participation in any program component.

[b]No family in the sample would opt for this alternative relative to some other alternative in the program package.

indicated by subscripts. For example, the subscript "III:FAP+SS" refers to families who are offered the alternative associated with program package III (FAP-FSP-SS) and who select the FAP and the SS components. Similarly, "II & IV:NP" refers to families who, when offered the alternatives associated with program packages II or IV, would elect not to participate in any program component. The superscripts t and e refer, respectively, to income that is taxable and tax-exempt under the rules for FAP. Note that since taxable income is defined differently under FAP than it is under PC, it was necessary to establish two different sets of equations, one for program packages I and III and another for II and IV.

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earned income per quarter from taxation be interpreted? In general, it is assumed that program provisions will receive a liberal interpretation.

1. $Y_{I\&III:NP} = HW_h + E_b + E_c + Y_f$

2. $Y_{III:FAP+FSP+SS} = Y_{III:FSP+SS} = (1-.1805)\ [(1-.8)\ E_{III}^{t(4/5)} + (1-.667)\ E_{III}^{t(2/3)} + HW_h^e + G_{SS}] + 296.04 + 183.6 \cdot N$

3. $Y_{III:FAP+SS} = Y_{III:SS} = (1-.8)\ E_{III}^{t(4/5)} + (1-.667)\ E_{III}^{t(2/3)} + HW_h^e + G_{SS}$

4. $Y_{I:FAP+FSP} = (1-.1805)\ [(1-.5)\ (HW_h^t + E_b^t + Y_f^t) + HW_h^e + E_b^e + E_c + Y_f^e + 400 + 300 \cdot N] + 296.04 + 183.6 \cdot N$

5. $Y_{I:FSP} = (1-.1805)\ [HW_h + E_b + E_c + Y_f] + 296.04 + 183.6 \cdot N$

6. $Y_{II\ \&\ IV:\ NP} = HW_h + E_b + E_c + Y_f + Y_a$

7. $Y_{IV:PC+SS} = Y_{IV:SS} = (1-.8)\ E_{IV}^{t(4/5)} + (1-.677)\ E_{IV}^{t(2/3)} + G_{SS}$

8. $Y_{II:PC} = (1-.5)\ [HW_h + E_b + E_c + Y_f + Y_a] + 600 + 450 \cdot N$

where

Y = family income

HW_h = head's earnings (hours worked times the hourly wage rate)

E_b = earnings of persons in family, other than head or students in school

E_c = earnings of students in school

Y_f = family's nonearned income

Y_a = imputed earnings from net assets (10 percent of net worth, excluding furnishings and personal effects)

N = number of persons in family

$HW_h^e = \$720$, if $HW_h \geq \$720$; $HW_h^e = HW_h$, if $HW_h < \$720$

$E_b^e = \$120$, if $E_b \geq \$120$; $E_b^e = E_b$, if $E_b < \$120$

$Y_f^e = \$120$, if $Y_f \geq \$120$; $Y_f^e = Y_f$, if $Y_f < \$120$

$HW_h^t = HW_h - HW_h^e$

$E_b^t = E_b - E_b^e$

$Y_f^t = Y_f - Y_f^e$

$E^{t(4/5)}$ = earnings of state supplement recipients that are taxable at a four-fifths rate

$E_{III}^{t(4/5)} = HW_h^t + E_b + E_c - 2(400 + 300 \cdot N)$, if $HW_h^t + E_b + E_c > 2(400 + 300 \cdot N)$; $E_{III}^{t(4/5)} = 0$, if $HW_h^t + E_b + E_c \leq 2(400 + 300 \cdot N)$

$E_{IV}^{t(4/5)} = HW_h + E_b + E_c - 2(600 + 450 \cdot N)$, if $HW_h + E_b + E_c > 2(600 + 450 \cdot N)$; $E_{IV}^{t(4/5)} = 0$, if $HW_h + E_b + E_c \leq 2(600 + 450 \cdot N)$

$E^{t(2/3)}$ = earnings of state supplement recipients that are taxable at a two-third rate

$E_{III}^{t(2/3)} = HW_h^t + E_b + E_c - E_{III}^{t(4/5)}$

$E_{IV}^{t(2/3)} = HW_h + E_b + E_c - E_{IV}^{t(4/5)}$

G_{SS} = the state supplement guarantee[1]

Before turning to the actual results from the simulation, five additional points must be made.

First, in accordance with FAP's eligibility requirements, families without dependent children under 18 years (21 years if attending school) are not permitted to participate in either of the program packages incorporating FAP (packages I and III), no matter how low their income. Families whose combined holdings in farms, businesses, real estate (excluding their own home), bank accounts, bonds, and stocks exceeded $2000 were similarly excluded.

Second, food stamps are treated as cash income receipts. Whatever differences in utility may occur from receipt of a dollar and receipt of a dollar's worth of food stamps are disregarded.

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[1] To find the actual amount of the SS guarantee see the schedule on p. 61.

Third, there may be a few families whose initial earnings are greater than $720, but fall below $720 as the husband reduces his work effort. In this case, the marginal FAP or SS tax rate that is applicable to the family falls to zero. To keep the simulation manageable, however, it is assumed that the marginal tax rate that is applicable at the family head's initial hours of work remains applicable throughout the adjustment process. Similarly, in analyzing a given program package, families are not permitted to switch from one alternative set of program components to another as the head's work effort is reduced, although in a few cases it would be rational for them to do so.

Fourth, the simulations, especially those for programs with very high tax rates and income guarantees, necessarily depend upon extrapolation of the regression results outside the range of most of the observations. The average wage for the New York City sample, for example, is $2.96 with a standard deviation of $1.71, while mean value for the accrual version of nonearned income is $415, with a standard deviation equal to $797.

Fifth, in light of the rather small sample for New York City, the simulation results should be interpreted with care. The results ultimately stand on the assumption that correct weights have been assigned to the fraction of families in the New York City sample who, according to the simulation technique, will participate in the simulated programs.

THE SIMULATION RESULTS

Aggregate Aspects of Negative Income Tax Programs

Some of the major questions concerning the aggregate impact of income maintenance programs are: How many families will participate in the program? What is the total cost of the subsidy provided by the program? By how large a fraction is labor supply reduced? What is the cost in terms of production forgone of the reduction in work effort? Table 12 presents some answers to these questions based on the simulation.[1]

[1]Estimates for each of the four program packages is presented in Table 12. Estimates for families who would elect to participate in the

Table 12

ESTIMATED AGGREGATE IMPACT OF PROGRAM USING THE LOWER BOUND PROCEDURE AND THE HIGH SUBSTITUTION AND INCOME EFFECT ESTIMATES

Simulated Program Packages	Number Program Participants (thousands)	Total Subsidy (thousands of dollars)	Total Production Loss (thousands of dollars)	Total Welfare Cost (thousands of dollars)	Hours Reduction as a Percent of all Hours Worked by Sample Population[a]	Production Loss as a Percent of Total Earnings of Sample Population[a]
Based on the High Substitution and Income Effect Estimates ($\epsilon^s = .30$ and $C^y = 0.16$)						
FAP-FSP						
FSP	149.1	37,785.4	49,488.5	3,433.1	0.68	0.55
FAP+FSP	96.8	162,625.8	97,806.9	18,434.3	1.56	1.08
FAP-FSP-SS	344.8	1,015,521.5	579,736.9	146,182.5	8.39	6.40
PC	173.0	217,623.4	149,374.0	17,247.0	2.32	1.65
PC-SS	321.9	748,418.5	444,268.5	107,826.3	6.79	4.91
Based on the Low Substitution and Income Effect Estimates ($\epsilon^s = .08$ and $C^y = -.08$)						
FAP-FSP						
FSP	149.1	31,209.5	13,057.7	672.0	0.18	0.14
FAP+FSP	96.8	122,349.5	29,545.4	3,608.1	0.47	0.33
FAP-FSP-SS	344.8	700,455.6	174,948.4	28,612.5	2.53	1.93
PC	173.0	164,759.2	43,645.9	4,914.8	0.68	0.48
PC-SS	321.9	521,922.1	131,474.5	21,105.1	2.00	1.45

[a]The term "sample" population refers to the sample on which the analysis was based: married males under 62 years of age who are heads of New York City households.

Before considering the estimates themselves, I shall discuss some aspects of their scope and construction. First, the results pertain to a limited, although extremely important, segment of the population: families headed by working married males under 62 years of age. This includes the largest population group eligible for coverage under proposed programs but previously excluded from most income maintenance programs. It is, therefore, the principal segment of the population whose work incentives will be adversely affected by programs such as those proposed by the Administration and the President's Commission. Nevertheless, there are other potential participants, such as families headed by older males or by females, that should be taken into account to obtain estimates of the comprehensive aggregate impact of these programs. Furthermore, only the husband's initial response to each program is considered. Secondary effects or reactions of other family members are not taken into account.[1]

Second, the sample used in the simulation seriously underrepresents the total number of families in the New York City population that are headed by working males less than 62 years old. Observations were removed from the sample, for example, if the family already received welfare, or if the head did not work or did not work at his usual job during the week preceding the survey.[2] As a result, the aggregate number of program participants that can be obtained directly from the simulation substantially understates the actual number. Therefore, to

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food stamp, but not the FAP, component of the FAP-FSP package are presented separately from the results for those who would participate in both components, because the combined impact of FAP and FSP is so different from FSP alone that averaging the two sets of results would be misleading.

[1]The simulation procedure attributes the entire initial response to the imposition of a negative income tax to the husband. Adjustments of other family members are neglected. In principle, of course, adjustments of work effort would be made simultaneously by the entire family with hours of work reallocated among the family members.

[2]Complete information on the composition of the sample is provided in Appendix A.

obtain the number of participants in a given program package, the "raw" number of participants was multiplied by the following inflator:

$$\frac{\text{Total number of married male family heads in New York City in 1968 with wives present, under 62 years of age, who worked in 1967}^{1}}{\text{Total number of New York City family heads represented by the weighted simulation sample}} = \frac{1,365,747}{787,188} = 1.73$$

Third, it is likely that families who were eliminated from the sample because of missing information and for other reasons were disproportionately from the low end of the income distribution. Thus, the percentage of families in the sample who would participate in a program may be lower than the actual proportion of New York City families with working male heads under 62 who would participate. A crude indication of the magnitude of understatement is suggested by Table 13. The first column in the table is estimated from the 1968

Table 13

CUMULATIVE PERCENTAGE INCOME DISTRIBUTION OF FAMILIES HEADED BY MALES WITH WIVES PRESENT

Income Class	Housing Survey (1)	SEO Simulation Sample (2)	(1) ÷ (2) (3)
Less than $4000	8.3	5.0	1.66
Less than $6000	25.5	23.0	1.11
Less than $8000	45.4	46.3	0.98
Less than $15000	87.0	89.9	0.97

New York City Housing and Vacancy Survey, a report of the United States Bureau of the Census. The second column is calculated directly from the weighted simulation. If the first column is an accurate summary of the income distribution of male headed households in New York City,

[1] This number was estimated from U.S. Bureau of the Census, New York City Housing and Vacancy Survey, 1968.

the ratio of column (1) to column (2) will indicate the magnitude of the distortion that resulted because observations that were dropped from the simulation sample were not random with respect to income. Since the range of the average pre-program incomes of the families participating in various packages is approximately $4000 to $6000, column (3) suggests that as a result of this factor the estimates reported in Table 12 could be understated by 11 to 66 percent. It should be recognized, however, that there is considerable uncertainty about the actual income distribution at relatively low incomes. If there is substantial underreporting of incomes in the Housing Survey, the 11 to 66 percent adjustment factor may be too large.[1]

Another point that should not be overlooked is that the estimates are based on 1966 income levels. Nationally, however, median family income increased by over 25 percent from 1966 to 1969, while in New York City the average weekly earnings of production workers employed by manufacturers increased by 22.6 percent between 1966 and June 1970;[2] and there is no reason to think that the distribution of income has changed much in the meantime. The rather substantial inflation and productivity growth since 1966 suggests that estimates of aggregate impact, particularly estimates of number of participants and program subsidy, are substantially larger than would be estimated from data on income for 1970 or 1971. Because of the real uncertainty that exists concerning the low end of the income distribution, estimates based on it are more appropriately characterized as a range of possible outcomes. Since the Housing Survey distribution very likely reflects considerable underreporting and in view of the increase in incomes

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[1] Because unusually detailed income questions were asked during the SEO, income is less likely to be underreported there than in the Housing Survey. There is an additional factor that also suggest 11 to 66 percent may be something of an exaggeration. The Housing Survey distribution includes men between 62 and 65 years of age, the simulation sample does not. There is, however, a factor that works in the opposite direction: The Housing Survey distribution is based on 1968 income, the simulation sample distribution on 1966 income.

[2] U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings series.

since 1966, however, the estimates presented in Table 12 can be regarded as reasonable gross approximations for 1971.

These approximations should be considered gross rather than net because they do not take account of the welfare income that New York City families headed by working males under 62 years of age receive at the present time. To the extent that such families already receive income supplements and already face implicit tax rates, some of the estimated decline in work effort will already have occurred and some of the estimated cost is already being incurred. On the basis of very incomplete data, I estimate that in 1970 male headed families in New York City may have received as much as $100 million from the Home Relief and the Temporary Aid to Dependent Children programs.[1] Thus, the simulation estimates can be considered roughly applicable to a program package that becomes operational in 1971; but in terms of a "before and after" comparison of program impact the relevant base date is closer to 1966 (when few families headed by males under 62 received welfare)[2] than to 1970 or 1971.

One of the most readily apparent aspects of the aggregate estimates presented in Table 12 is their sensitivity to the range of the hours of work responsiveness estimates used in their calculation. Transfer costs for the administration's proposed FAP+FSP program, for example, vary by about one-third between the low and the high hours response estimates. And reductions in hours, welfare costs, and production losses are proportionately much more sensitive to differences in labor supply responsiveness than are transfer costs.[3]

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[1] $100 million is thought to be close to a maximum estimate, although it must be emphasized that the estimate is based on incomplete information found in various issues of the New York City Department of Social Services, Monthly Statistical Report.

[2] It should also be noted that the small number of these families who did receive welfare in 1966 were excluded from the sample.

[3] To limit the range of discussion, I shall concentrate on the simulation results associated with the lower bound procedure and with the high substitution and income effect estimates, the set of predictions I feel most closely approximates the potential gross effects of the simulated programs. Furthermore, FAP-FSP -- the program package of most current policy interest -- will be considered in most detail.

Table 12 indicates that almost 100,000 New York City households headed by a working male under 62 will be covered by FAP+FSP.[1] An additional 150,000 such households will apparently participate in food stamps, but not in FAP. On the basis of the high income and substitution effect estimates, it appears that together these two groups of households will receive a total subsidy of about $200 million. While the $200 million will be partly offset by welfare payments that are already being made to these families, the $100 million figure mentioned above substantially exceeds the amount of the offset. Some of the $100 million was received by families with heads over 62 years old and some by childless couples not eligible for FAP. More important, some of these funds permit families to reach income levels that are in excess of the standards provided by the FAP-FSP package and would continue to be paid out even after the package was implemented. Thus, $60 to $70 million may be a more reasonable estimate of the actual offset.

The economic losses that would result from the reduction in labor supply after the introduction of the FAP-FSP package appear to be within tolerable limits, even when gross estimates based on the high pair of income and substitution effect estimates are considered. Table 12 indicates, for example, that the labor supply of married male family heads, who are under 62 and who live in New York City, would be reduced 2.2 percent by the total FAP-FSP package (i.e., FAP+FSP plus FSP). The production loss would be about 1.6 percent of total earned income. While these percentages are somewhat larger than comparable national figures (1.6 and .9 percent, respectively), they do not seem unduly large. The absolute production loss reported for FAP-FSP in Table 12 is less than $150 million and the associated welfare cost is $22 million. After taking existing programs into consideration, these losses would, of course, be somewhat smaller.

The President's Commission's proposals permit childless couples to be subsidy recipients. The PC proposals also are associated with

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[1]This is approximately 7 percent of all such households in New York City. The comparable figure for the United States is 9 percent.

lower tax rates than FAP+FSP. For these reasons, more families would participate in the Commission's program, which consequently produces higher hours reductions and production losses than FAP+FSP and is associated with a somewhat higher subsidy bill. However, if the total FAP-FSP package (i.e., FAP+FSP plus FSP) is compared with the PC package, there is very little difference in aggregate impact.

The impact of adding state supplements either to the FAP-FSP package or to the PC package is dramatic.[1] The number of participating families would be approximately doubled, while the proportional increases in the various dimensions of program costs -- hours reduction, production loss, welfare cost and subsidy payments -- would be even greater. There are two reasons why the increase in program costs exceeds the increase in the number of participants. First, the higher tax rates and guarantee levels that are associated with state supplements cause the original FAP-FSP participants or PC participants to make an additional reduction in their labor supply. Second, the newly added participants tend to work relatively more hours at higher wage rates than the original participants.

Table 14 reports on the distribution among program components of the total subsidy bill for each program package. Only results that use the lower bound procedure are presented. As expected, most of the subsidy associated with the FAP-FSP-SS and PC-SS packages is paid under the state supplement component. Table 14 also indicates that the addition of state supplements to the basic FAP-FSP package severely reduces the size of the subsidy paid under the food stamp program.

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[1] This comparison may, if anything, be somewhat understated. First, for high tax rates, such as those associated with the packages incorporating state supplements, estimates of hours responses are likely to be substantially less reliable and labor force participation decisions should be explicitly considered. Extreme changes in workers' net wage rates are less likely to give rise to only incremental hours reductions and more likely to give rise to complete withdrawal from the work force. Second, the analytic framework underlying the simulation procedure is essentially static, and for programs with very high tax rates, actual labor supply adjustments are likely to differ sharply from those that were estimated.

Table 14

ESTIMATED NUMBER OF PARTICIPANTS AND TOTAL SUBSIDY FOR PROGRAM PACKAGES AND THEIR COMPONENT PROGRAMS USING THE LOWER BOUND PROCEDURE

	I FAP-FSP		III FAP-FSP-SS		II PC		IV PC-SS	
	Number of Participants[a]	Total Subsidy	Number of Participants[a]	Total Subsidy	Number of Participants	Total Subsidy	Number of Participants[a]	Total Subsidy
Based on the High Substitution and Income Effect Estimates ($\epsilon^s = .30$ and $C^y = -.16$)								
Total program package	246,000	$200,411	345,000	$1,015,522	173,000	$217,623	322,000	$748,419
Component programs								
FAP	97,000	101,098	218,000	202,304				
FSP	246,000	99,313	102,000	21,443				
PC					173,000	217,623	289,000	317,611
SS			345,000	791,775			322,000	430,808
Based on the Low Substitution and Income Effect Estimates ($\epsilon^s = .08$ and $C^y = -.08$)								
Total program package	246,000	153,559	345,000	700,456	173,000	164,759	322,000	521,922
Component programs								
FAP	97,000	67,237	141,000	92,397				
FSP	246,000	86,322	102,000	14,003				
PC					173,000	164,759	207,000	189,405
SS			345,000	594,056			322,000	332,517

[a]The sum of the participants in a program package's components exceeds the total for the package as a whole, since some families receive subsidy payments under more than one component program.

This is because food stamps is a residual program that taxes all sources of income, including subsidies paid under FAP and SS. The state supplement program is so generous in New York City that it moves the incomes of most families that are headed by poor working males above, or at least near, the FSP breakeven level. As a result, state supplements can be viewed as state and local programs that tend to supplant, as well as supplement, federal programs.

The subsidy costs for program package I -- $150 million to $200 million according to Table 14 -- would be borne entirely by the federal government. It was estimated above that perhaps $60 to $70 million of the gross cost of this package would be offset by existing welfare payments to families headed by males under 62 years of age. As a very rough approximation, it is further estimated that around 50 million of these dollars are now paid from New York State and New York City funds.[1] Thus, state and city payments to families headed by poor working males under 62 years of age should be reduced by around $50 million.

Table 14 indicates, however, that should the state or the city decide to supplement federal payments to these families, the $50 million savings would be of little help. The increased cost to the state and city governments as a result of such a supplement apparently would be $600 to $800 million.

Program Impact on Average Participants

Table 15 presents estimates indicating how an "average" participating family would be affected by each of the simulated program packages. One of the most prominent features of the simulation results for the Administration's FAP+FSP program is the level of average income of participating families. Family income without the program averages $4,162, and earnings of the head averages $3,895. Calculations based on the high (low) hours response estimates indicate that an average

[1]These numbers once again are crude estimates based on the fragmentary information contained in the New York City Department of Social Services, Monthly Statistical Report.

Table 15

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT USING THE LOWER BOUND PROCEDURE

Simulated Program Packages	Pre-Program Hours	Hours Reduction					Pre-program Earnings ($)	Production Loss				Welfare Cost ($)	Pre-program Family Income ($)	Net Change in Family Income		
		Mean Hours Reduction	Percent Attributable to:		Percent Change in Hours			Mean Loss in Production ($)	Percent Attributable to:		Percent Production Loss			Total ($)	Percent with Positive Change	Annual Subsidy ($)
			Subs. Effect	Income Effect	Economic	Individual			Subs. Effect	Income Effect						
Based on the High Substitution and Income Effect Estimates (ε^s = .10 and C^y = -.16)																
FAP-FSP																
FSP	1993	131	77.3	22.7	6.6	6.6	$5029	$332	76.9	23.1	6.6	$23	$5713	-$78	27.4	$253
FAP+FSP	1785	461	64.1	35.9	25.8	26.9	3895	1010	63.9	36.1	25.9	190	4162	669	100.0	1679
FAP-FSP-SS	2031	696	64.0	36.0	34.2	36.0	4909	1681	64.2	35.8	34.2	424	5385	1264	87.7	2945
PC	1834	384	67.1	32.9	20.9	21.7	4133	863	67.2	32.8	20.9	100	4593	395	65.4	1258
PC-SS	1954	604	66.3	33.7	30.9	32.4	4446	1380	66.0	34.0	31.0	335	4981	945	82.6	2325
Based on the Low Substitution and Income Effect Estimates (ε^s .08 and C^y = -.08)																
FAP-FSP																
FSP	1993	34	57.7	42.3	1.7	1.7	$5029	$89	57.0	43.0	1.7	$5	$5713	$122	93.8	$209
FAP+FSP	1785	139	41.6	58.4	7.8	8.3	3895	305	41.4	58.6	7.8	37	4162	958	100.0	1263
FAP-FSP-SS	2031	210	41.5	58.5	10.3	11.3	4909	507	41.7	58.3	10.3	83	5385	1524	95.3	2031
PC	1834	112	44.9	55.1	6.1	6.5	4133	252	45.0	55.0	6.1	28	4593	700	98.6	952
PC-SS	1954	178	44.0	56.0	9.1	9.9	4446	408	43.7	56.3	9.2	66	4981	1213	96.4	1621

Notes to Table 15

Two measures of the percentage reduction in hours are presented. The percentage change in hours in economic terms equals $\frac{\sum_{i=1}^{n} \Delta H_i}{\sum_{i=1}^{n} H_i}$ while in individual terms it equals $\frac{\sum_{i=1}^{n} \frac{\Delta H_i}{H_i}}{n}$,

where n is the total number of program participants. In less formal terms, the economic measure is calculated by dividing the average number of pre-program hours into the mean reduction in hours. The individual indicator is derived by first dividing each participant's initial hours into that participant's reduction in hours and then averaging. This indicator gives each individual equal weight. The first measure, on the other hand, gives greatest weight to those whose pre-program economic contribution, in terms of hours worked, is largest. Although the economic indicator is a more relevant measure of the impact of a particular program upon the economy, the individual indicator is probably the closest statistical approximation of what is implied in public speculation over how a typical recipient is likely to respond to a negative income tax and indicates the cleavage between those who receive subsidies and those who do not that is likely to develop in a work-oriented society. The individual indicator also tends to be larger than the first index because participants with low initial hours tend to receive the largest subsidy amounts and hence tend to make the greatest proportional adjustments in their labor supply. The percent production loss is presented only in economic terms. It equals

$$\frac{\sum_{i=1}^{n} \Delta H_i \cdot W_i}{\sum_{i=1}^{n} H_i \cdot W_i},$$

where n is the total number of program participants. In individual terms the present production loss is identical to the percent change in hours in individual terms; that is,

$$\frac{\sum_{i=1}^{n} \frac{\Delta H_i \cdot W_i}{H_i \cdot W_i}}{n} = \frac{\sum_{i=1}^{n} \frac{\Delta H_i}{H_i}}{n}.$$

subsidy of $1,679 ($1,263) dollars combined with a decline in earnings of about $1,010 ($305) leads to an average increase in income of about $669 ($958). The evidence below suggests that the principal reason for the relatively high pre-program income levels, somewhat above the poverty line for a family of four, is the prevalence of relatively large families.

Although the average income of families who purchase food stamps, but are not eligible for FAP, is over one-third higher than the average for families who also participate in FAP, the average subsidy of $209 to $253 that they receive is much less. Consequently, these families make relatively small adjustments in their labor supply. Nevertheless, the results indicate that for many such families, their loss in earnings will equal or exceed their subsidy, so that on the average there is little, if any, change in their money incomes. This suggests that offering food stamps to families who choose not to participate in FAP results in no net gain, except in increased leisure, for the participants.

Results based on the high substitution and income effect estimates indicate that the average participating male family head would reduce his work effort by about one-quarter. In terms of production loss the result is very similar. The results based on the low labor responsive estimates, however, imply a much smaller labor supply adjustment. Both the estimates for the average participating family and the aggregate estimates indicate that out of each dollar of income subsidy under FAP+FSP, 25 cents (using the low income and substitution effect estimates) to 60 cents (using the high estimates) is taken out for increased leisure. It might seem surprising that families at the low end of the income distribution would place so high a value on increased leisure, but it should be recognized that the program gives rise to a very substantial change in incentives.

In a comparison of the estimated effects on the "average" participating family in the Administration's basic program (FAP-FSP) with the impact on the average participant in the other three program packages, it is necessary to keep in mind that the number and composition of families differ between alternative program packages. Comparisons of

different programs reflect the shifting populations for which the averages were computed and not how a given group of families is on average affected by different programs. If guarantee levels are increased, for example, higher income families are made eligible for subsidy payments. Although the average subsidy obtained by low income families increases under more generous programs, small subsidies received by families eligible only for more generous programs tend to depress the overall average. Moreover, since the density of the income distribution increases with increasing incomes over the range I considered, larger numbers of families are marginally affected under more generous programs. This shifting mix of participants, which affects all of the measures reported in Table 15, obscures the impact on a given family of different programs.

If enacted, the President's Commission's proposals would have a somewhat less adverse effect upon the labor supply of the average participant than FAP+FSP. On the other hand, the Commission's program provides for a smaller average subsidy payment and consequently results in a smaller average net increase in money income.

Permitting families headed by working males to receive state supplements causes a drastic change in program impact. While the magnitude of this change is somewhat camouflaged in Table 15 by the weighting phenomena described above, the results do indicate that the percentage reduction in hours or production for the average participant would be increased by about a third through the addition of state supplements to either FAP-FSP or PC. The average size of the subsidy payment would be almost doubled. And the average net increase in family incomes would also be very substantial.

Program Impact by Selected Characteristics of Participants

The estimates presented up to this point are applicable to male-headed families of the working poor as a group. Table 16 presents estimates of the impact of selected programs on selected demographic sub-groups. The estimates reported there permit comparisons of hours reductions and production losses applicable to each group as well as

Table 16

THE ESTIMATED IMPACT OF FAP+FSP AND FAP-FSP-SS ON SELECTED DEMOGRAPHIC GROUPS USING THE LOWER BOUND PROCEDURE

	Hours Reduction as a Percentage of All Hours Worked by Demographic Group		Production Loss as a Percentage of Total Earnings of Demographic Group		Percentage Distribution of the Total Subsidy by Demographic Group	
	FAP+FSP[a]	FAP-FSP-SS[b]	FAP+FSP[a]	FAP-FSP-SS[b]	FAP+FSP[a]	FAP-FSP-SS[b]
Based on the High Substitution and Income Effect Estimates ($\varepsilon^s = .30$ and $C^y = .16$)						
Total	1.56	8.38	1.08	6.40	100.00	100.00
Race						
White	0.88	6.50	0.61	4.98	42.93	60.70
Black	4.73	17.34	4.03	15.72	57.04	39.30
Age						
14 to 25 years	0.25	3.21	0.18	2.74	1.52	3.36
25 to 55 years	2.02	9.89	1.39	7.62	96.14	89.53
55 to 62 years	0.20	4.42	0.12	2.67	2.34	7.16
Size of family						
5 persons or fewer	0.68	8.31	0.40	6.16	28.06	58.26
6 persons or more	10.27	26.96	9.37	25.61	71.94	41.74
Total family income						
$4000 or less	12.17	26.87	11.78	27.10	30.46	15.69
over $4000	1.09	7.56	0.80	5.86	69.54	84.30
Based on the Low Substitution and Income Effect Estimates ($\varepsilon^s = .08$ and $C^y = -.08$)						
Total	0.47	2.53	0.33	1.93	100.00	100.00
Race						
White	0.25	1.89	0.18	1.45	40.91	57.96
Black	1.49	5.59	1.27	5.06	59.05	42.04
Age						
14 to 25 years	0.08	0.99	0.06	0.86	1.62	3.45
25 to 55 years	0.61	3.01	0.42	2.31	95.88	89.66
55 to 62 years	0.06	1.23	0.04	0.75	2.50	6.93
Size of family						
5 persons or fewer	0.21	2.33	0.12	1.72	29.17	53.80
6 persons or more	3.08	9.23	2.81	8.82	70.83	46.21
Total family income						
$4000 or less	3.62	9.47	3.52	9.51	31.24	18.53
over $4000	0.33	2.23	0.24	1.73	68.76	81.47

[a]Refers to the FAP+FSP segment of the FAP-FSP package.

[b]Refers to the entire FAP-FSP-SS package.

comparison of the percent of the total subsidy each receives. This part of the analysis is confined to two program combinations that offer a particularly interesting comparison: the FAP+FSP segment of the FAP-FSP program package and the full FAP-FSP-SS program package.

The results based on the high labor responsiveness estimates indicate that the gross hours reduction of Negro married male family heads under 62, as a percent of total hours worked by both participants and non-participants in that group, would be nearly 5 percent under FAP+FSP and over 17 percent under a program package that incorporates state supplements as well as FAP and food stamps. The comparable percentages for whites are .9 percent and 6.5 percent, respectively. These differentials do not arise because Negroes are more responsive to work incentives than whites; the same labor responsiveness estimates were used for both groups in the simulation because there was no convincing evidence of a significant difference by color. The difference in percentage hours reductions instead reflects the fact that incomes of Negro families are disproportionately low, and as a consequence they are more likely than white families to qualify for a negative income tax program. Other demographic groups with relatively large reductions in work effort are families with six or more members and families with annual incomes of less than $4000. The great reduction by large families is explained by the fact that the size of the subsidy, and hence the size of the income effect, is positively related to size of the family. Production losses, reflecting the impact of both hours reduction and low wages, are generally smaller in percentage terms but follow a pattern similar to that of hours reductions.

The estimates of the percentage of the total subsidy received by each demographic group are particularly interesting. Whites in New York City would only receive about 43 percent of the total FAP+FSP but more than 60 percent of the FAP-FSP-SS subsidy. This is because the more generous FAP-FSP-SS parameters permit relatively higher income families to participate; and a larger proportion of higher income families tend to be headed by whites. Prime age males (25 to 55 years old) would apparently receive the lion's share of the subsidy under either program combination.

Large families would receive a very large share of the total subsidy according to these estimates. Although a "typical family of four" is often used to illustrate the operation of negative income tax programs, over 70 percent of the subsidy under FAP+FSP would go to families with six or more persons. These estimates suggest that the family of four is quite atypical in terms of the major beneficiaries of the program. On the other hand, such families would receive well under 50 percent of the FAP-FSP-SS subsidy. This result emphasizes an important difference between the FAP and the SS guarantee levels: The percentage rate of increase for each additional family member is considerably larger for FAP than for SS. About two-thirds of the families participating in FAP+FSP would have six or more persons, but less than one-third of the families participating in FAP-FSP-SS are that large.

Although average income for families participating in FAP+FSP was just over $4000, over two-thirds of the subsidy would be received by families with incomes over $4000. This difference reflects the tendency for large families to receive a large share of the subsidy, and it also provides an explanation of why the average income of participating families is relatively high in comparison with the poverty line for a family of four. Because of the high guarantee levels associated with state supplements, over four-fifths of the FAP-FSP-SS subsidy would go to families whose incomes exceed $4000.

SUMMARY OF THE FINDINGS

The most important empirical findings from this study are the following:

1. There is evidence indicating that the hours of work of male heads of families in New York City are more responsive to changes in economic incentives than the hours of work of male family heads in the rest of the nation.

2. If the Family Assistance Plan or similar legislation is enacted, some of the present costs to the city and state

of existing welfare payments to male headed households will be borne by the federal government. Nevertheless, such legislation would not be an unmitigated blessing. There will be an appreciable (although economically tolerable) reduction in the supply of low-wage male labor.

3. Large families and black families in the city would receive a large proportion of the subsidy paid out under a combined Family Assistance and Food Stamp program, the first group because of the way the program is structured and the second group because they are disproportionately poor. In addition, a perhaps surprisingly large percentage of the subsidy will be received by families with annual incomes over $4000.

4. An attempt by the city or the state to supplement proposed federal programs by supporting families headed by working males at the same level as families currently eligible for, say, Aid to Dependent Children would be expensive, in terms of both the direct cost of the subsidy payments and the indirect costs associated with the resulting substantially increased reductions in the labor supply. It is estimated that the net addition to the direct welfare costs of the city or state would be about $600 to $800 million. This would amount to a significant increase in welfare costs.

Appendix A

TECHNICAL DISCUSSION

THE DATA

The data underlying this study were taken from the 1967 Survey of Economic Opportunity (SEO). The SEO sample consists of over 27,000 interview units and is made up of two parts. The first, about 60 percent of the total sample, is a national self-weighting sample designed the same way as the 1966 Current Population Survey (CPS) but about half the size. The second sample was drawn from areas with large concentrations of nonwhites. The reason for the supplementary sample was to increase the reliability of estimates of the characteristics of the poor nonwhite population, a group that is typically underrepresented in regular census enumerations.

From the perspective of a study of the effects of a negative income tax on the work incentives of the poor, the SEO file has several distinct advantages over the CPS file:

1. Nonwhites in poor areas are oversampled. The SEO provides somewhat better estimates for nonwhites than does the CPS.

2. A more accurate measure of hourly wages can be obtained. Using the SEO file, hourly wages, W, are calculated from the formula, $W_{SEO} = \frac{EW}{HW}$, where EW and HW are earnings and hours, respectively, during the week previous to the survey. EW is not obtained by the CPS. Thus, W is calculated from the formula, $W_{CPS} = \frac{EY}{(WY)(HW)}$, where EY and WY are earnings and weeks of work, respectively, during the year preceding the survey year. WY is recorded for rather wide intervals (for example, 1-13 weeks, 14-26 weeks, and so on).

3. The SEO offers greater internal consistency. SEO interviewees were asked all survey questions during a single interview. During the CPS, the work experience questions and the income questions are asked in two successive months. This may result in inconsistencies, especially if two different family members are interviewed.

4. The SEO made a detailed inquiry into asset holdings and liabilities. The CPS does not provide direct information on family asset and liability structures.

THE SAMPLE USED IN THE REGRESSIONS

Since the New York City sample is simply a subset of observations from the national sample, the derivations of the national sample will be discussed in some detail. This will be followed by a brief comment on the New York City subsample.

The National Sample

The analysis of labor supply was concentrated on one important demographic group in the 1967 SEO file: married males with wives present. The men selected were less than 62 years old and headed households with incomes that did not exceed $15,000 in 1966. (For purposes of comparison several regressions were run with unrelated males in the same age-income class.) This particular sample was selected because it is relatively homogeneous, the model was applicable to this group in a reasonably straightforward fashion, and of all the potential recipients of income supplements, policymakers and the public are certainly most concerned with the work responses of men with family responsibilities. Most of the other groups covered by most proposed negative income tax plans already receive some income maintenance benefits. This is the major group to whom such benefits will be extended for the first time. It is the labor supply response of this group to a negative income tax that potentially could be most damaging to the national economy.

It was necessary to restrict the sample of married men (and the sample of unrelated males) in six additional ways (see Table A-1).

(1) Missing information. Cases where the data necessary to construct one or more of the variables were unavailable were dropped from the sample. The dominant source of unobtainable information was the failure or inability of many interviewees to answer all of the detailed questions on assets and liabilities. A few additional observations were removed from the sample because the question as to whether the

Table A-1

DERIVATION OF THE WORKING SAMPLE[a]

Interview units in 1967 SEO file	27,337
Married males, less than 62 years old, wife present, heading household whose 1966 income was $15,000 or less	13,363
No missing information	10,134
Civilians at time of survey	9,891
Civilians with work experience in 1966	9,543
Wage rates available	7,923
Nonrecipients in 1966 of public welfare, unemployment compensation, or veterans' pensions or compensation	7,093
Worked at regular job the week previous to survey	6,044

[a]Each succeeding number refers to the remaining observations after the indicated restriction has been applied to the sample.

husband's health affects his ability to work was unanswered. Fortunately, many items were not missing because the Census Bureau provided imputed amounts when a question was unanswered. For example, an amount was imputed to all the income items that were originally in the "don't know" or "no answer" categories.[1] When the data necessary to construct a variable were imputed, the affected observations were left in the sample.[2]

(2) Participation in the Armed Forces. Information was not collected on the hours or weeks worked or the wage rates of members of the Armed Forces. The sample was therefore restricted to those who were civilians at the time of the survey.

(3) Work Experience. Only those who worked in 1966 were included in the sample. This restriction is of considerable importance. It excludes men whose labor supply was zero from my range of observation. Therefore, it was not possible to measure the extent to which a negative income tax results in a complete withdrawal from the labor force.

The restriction can be justified on two grounds. First, wage rates are not available for 315 of the 348 men without work experience in 1966. Second, and more fundamentally, in only a minority of these cases does the actual labor supply, as opposed to the measured labor supply, appear to be zero. This is indicated by the reasons given for not working:

Could not find work	14
Ill, disabled, unable to work	250
Going to school	24
In Armed Forces all of 1966 (but not at time of survey)	19
Retired	27
Other	14

[1]The basic imputation method was to assign an amount to a person or interview unit commensurate with his demographic characteristics; for example, a person not reporting income from interest was assigned the average interest income of those with the same age, race, sex, educational attainment, and work status.

[2]As a check, regressions were run with these observations omitted. This resulted in only minor changes in the regression coefficients.

It is clear that in 1966 only a few married men under 62 years old voluntarily withdrew from the labor force.[1] Thus, even if wage rates were available for the zero labor supply group, the cell is too small to be statistically dependable. Whether this cell would increase significantly upon introduction of a negative income tax is, of course, uncertain, but there is little potential for developing evidence on that question from these data.

(4) Wage rates. After elimination of those persons without work experience in 1966, 9,543 cases remained in the sample. Wage rates were not available for an additional 1,620 cases. Most of these observations fell into two groups. First, the self-employed in their own business, professional practice, or farm. These men (about 40 percent of the 1,620) were not asked the necessary questions. Second, those who did not work during the survey week (over 50 percent). The remaining persons (less than 10 percent) did not answer the necessary questions.

(5) Work on income conditioned income supplements. Conditional income supplements include unemployment compensation, public welfare, and veterans' pensions or compensation.[2] Recipients of such income are subject to implicit tax rates that the rest of the population is not. Since it is not possible to control statistically for the extent to which these tax rates influence their labor supply, these cases were excluded from the sample. (Similarly, family heads who were 62 years

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[1]Undoubtedly there are some malingerers among those who claim they were too ill or disabled to work, but there is reason to believe that most were legitimately disabled. In its 1966 survey of disability, the Social Security Administration found that about 3.6 percent of the almost 50 million males between 18 and 64 years old were "severely disabled" and were not working at all at the time of the survey (Lawrence D. Haber, "Disability, Work and Income Maintenance: Prevalence of Disability, 1966," Social Security Bulletin, May 1968, Table 3). Less then 3 percent of the SEO sample of married males claimed to be similarly disabled and did not work during 1966.

[2]Veteran's pensions are not military retirement pensions. They are nonservice-connected disability payments to disabled veterans (or their survivors) with incomes less than an amount specified by law. Veterans' compensation payments are for service-connected disability.

old or older, many of whom are eligible for income conditioned Social Security, were not included in the sample.)

(6) Reliability of reported wage and hour data. Respondents to the SEO survey were asked to name the employer for whom they worked the longest in 1966 and the kind of work performed. Those who were working for a different employer or at a different kind of work one week previous to being surveyed in February 1967 were dropped from the sample.[1] This restriction was imposed to exclude those who reported wages or hours that were atypical of their normal situation.[2]

The New York City Sample

This sample includes all households in the national sample that are located in the area designated by the Census Department as the "central city" subarea of the New York City Consolidated Metropolitan Area. Unfortunately, this incorporates central city Newark and Jersey City, as well as the five New York City boroughs. Because of disclosure rules, the information that would permit isolation of households located in the five boroughs is suppressed. However, there is no strong reason to believe that the labor force behavior of residents of central city Newark and Jersey City is very different from that of residents of the five boroughs. Thus, there is no reason to expect the regression results for New York City to be seriously distorted.

THE SAMPLE USED IN THE SIMULATIONS

The sample used in the simulations differed in three respects from the sample used in the regressions. First, the $15,000 income limit on the sample was removed. High income families were excluded from the

[1]Several regressions were run that did include this group of observations. Their inclusion does not appreciably affect the results.

[2]The following instruction to the SEO interviewers may have also helped in this respect: "If there was something unusual about last week's work such as overtime rates paid or reduced rates paid, try to obtain the normal weekly pay rate. If the normal weekly pay rate cannot be obtained for those cases, record the actual pay rate for last week."

regression sample so that the coefficient estimates would not be affected by relatively few extreme observations. Once the coefficients were estimated, however, there was no reason to retain this restriction on the sample.

Second, much of the asset and liability data that was necessary for the regressions was not needed for the simulations. Thus, fewer cases were eliminated because of missing information.

Third, recipients of unemployment compensation were included in the simulation sample. It was assumed that any income received under this program was taxable nonemployment income under the simulated negative income tax programs.[1]

THE VARIABLES

The variables that appear in the model are listed in Table A-2. The subscript h indicates that the variable refers to the head of the interview unit, s to his spouse, o to interview unit members other than the head or his spouse, and f to the entire interview unit. All the variables but those that involve income, earnings, wages, and labor supply refer to the interview unit's or individual's status at the time of the interview (February 1967). The income and earnings variables pertain to annual receipts during 1966.[2]

The variables that are footnoted in Table A-2 are more complex than the others and are more fully described below. The variables and constants that are used in the construction of these variables are listed in Table A-3.

(1) Labor Supply (L_h). This variable was calculated from the following formula,

$$L_h = (WY_h)(HW_h) .$$

[1]The most appropriate way of treating public welfare and veterans' pensions receipts is much less certain. Thus, families who received such income were excluded from both samples.

[2]The time periods covered by the wage and labor supply variables are discussed below.

Table A-2

VARIABLES USED IN THE MODEL

L_h	Labor supply[a]
M_f	Asset holdings[a]
W_h	Hourly wage[a]
W_h^2	Hourly wage squared
W_h^o	Wage dummy, equals W_h if W_h > \$2.00, otherwise equals 0
Y_f^a	Nonearned income, accruals[a]
Y_f^f	Nonearned income, flows[a]
P_h	Measure of relative preference for asset accumulation[b]
E_s	Earnings of spouse
E_o	Earnings of interview unit members other than head and spouse
A_h	Age
A_h^2	Age squared
D_h	Number of dependents, number of interview unit members excluding head and spouse
R_h	Race, 1 if nonwhite, 0 if white
S_h	Highest grade of school completed
K_h	Health, 1 if health limits ability to work, otherwise 0

[a]For full explanation of variable, see text of Appendix A.

[b]Construction of this variable is fully described in Section IV of the text.

Table A-3

VARIABLES AND CONSTANTS USED IN THE CONSTRUCTION OF THE COMPLEX VARIABLES IN TABLE A-2

WY_h	Number of weeks in the labor force per year	BY_f	Imputed income from business and/or farm
HW_h	Number of hours worked per week	LV_f	Money in bank accounts, credit unions, bonds, government bonds, stocks, etc.
EW_h	Pre-deduction earnings per week	LY_f	Imputed income from money in bank accounts, stocks, etc.
r	Rate of return	ID_f	Actual interest and dividend income
HV_f	Market value of (own) home	DT_f	Other debts (e.g., debts owed stores, utility companies, doctors, hospitals, banks and lending institutions)
HD_f	Debt owed on home	PY_f	Monthly payments against DT_f
HY_f	Imputed rental income from home	DY_f	Imputed (negative) income from other debts
RV_f	Market value of real estate holdings (other than own home)	TR_f	Direct transfer payment receipts (e.g., social security, pensions, annuities, royalties, private welfare, alimony, Armed Forces allotments)
RD_f	Debt owed on real estate holdings	H_h	Annual hours actually worked
RY_f	Imputed income from real estate holdings	$\hat{M}_f$	Predicted earned assets of family given the head's age and wage
RT_f	Actual rental income receipts		
CV_f	Market value of vehicles		
CD_f	Debt owed on vehicles		
CY_f	Imputed rental income from vehicles		
BV_f	Market value of business and/or farm		
BD_f	Debts owed by business and/or farm		

WY_h refers to the number of weeks in the labor force during 1966;[1] HW_h pertains to the number of hours worked during the week preceding the interview. The interview took place in February 1967. Since the sample was restricted to men who worked at the same job in February 1967 as they did for most of 1966,[2] computation of L_h from information on two different time periods should not result in any substantial inconsistencies between actual and estimated hours.

(2) Asset Holdings (M_f). Ideally, this variable would measure the value of assets accumulation resulting solely from the past work efforts of the head of the household. Unfortunately, there is no way to net out of an interview unit's net worth that part due to the work efforts of other family members, inheritance, exceptionally good or poor portfolio selection, and an exceptionally high or low propensity to save one's earnings. The measure of earned assets is simply each interview unit's net worth, that is, the difference between its assets and its liabilities.[3]

(3) Hourly Wage (W_h). This variable is calculated from the formula,

$$W_h = \frac{EW_h}{HW_h} \quad .$$

This measure of wages is based upon earnings and hours worked during the week preceding the survey interview. As explained earlier (p. 77), this measure of wages is superior to most available alternatives. Nevertheless, it is possible that for some men in our sample, wages during this particular week were unrepresentative of their usual hourly remuneration. Note that HW_h appears as a multiplicand in constructing L_h and is a denominator in W_h. Any errors in the measurement of HW_h, therefore, will negatively bias the coefficient when W_h is regressed against L_h.

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[1] WY_h is reported for the following intervals: 1 to 13 weeks, 14 to 26 weeks, 27 to 39 weeks, 40 to 47 weeks, 48 to 49 weeks, and 50 to 52 weeks. To calculate L_h, the midpoints of these intervals were used.

[2] See the section of this Appendix on the sample.

[3] Medical debt, a capricious item having little to do with past work effort, was not included as a liability for the purpose of calculating M_f.

(4) Nonearned income (Y_f). Most studies of the effects of income on the supply of labor have substantially underestimated nonearned income. The only measure that is usually available is cash income. This ignores the rental value of the home and other durable goods that a family may own. It also ignores appreciations in the market value of assets, such as land or stock, that are frequently not fully reflected in income flows as rents or dividends. If nonemployment income is to be accurately measured, the missing and understated amounts must be imputed. These amounts can be approximated by employing the detailed information on asset holdings provided by the SEO file together with an estimate of the rate of return, r, from these holdings.

In the calculations, a single value of 8 percent is used for r. In practice, of course, that rate of return may vary considerably between types of asset holdings. Capital markets are imperfect, risk varies between assets, some assets are more liquid than others, and lumpiness precludes many persons from purchasing certain assets (for example, one may deposit a dollar in a savings account, but to buy a home one must usually manage a rather substantial down payment). However, any attempt to make an appropriate adjustment of r between assets in order to account for all these factors would involve such a degree of arbitrariness that the consistent use of a single value for r seems most defensible. The value selected might be viewed as an approximation of the average rate of return from all assets.

Two different versions of nonemployment income were calculated. These are based upon two different ways in which nonearned income is perceived by the worker. To illustrate the two approaches, let us look at the case of a hypothetical worker who owns an acre of land. His average annual return from the land will equal r times his equity in the land. Part of this amount, however, may be received annually as rent and the remainder -- capital gains perhaps -- realized when the land is sold. According to the first approach, the worker adjusts his labor supply to the income that is accrued during the year, no matter when this income enters his cash stream. If he wishes, he could immediately realize his annual return by selling off part of his land. The fact that he does not choose to do so is irrelevant to his work-leisure

choice. The second nonearned income variant is based on the premise that a worker's current labor supply is adjusted to his current, nontransitory, cash income stream. Until his land is sold, only the rents that he receives during the year are germane to his supply decision. Upon selling his land, he may take an extended vacation.[1]

Although an approach based on the second premise does have considerable plausibility, the nonemployment income variant that it suggests is considerably more difficult to calculate from the information available in the SEO file than the first. The first variant, Y_f^a, is calculated from the following formula:

$$Y_f^a = HY_f^a + (RY_f^a \text{ or } RT_f) + CY_f^a + BY_f^a + (LY_f^a \text{ or } ID_f) - DY_f^a + TR_f,$$

where

$$HY_f^a = r(HV_f - HD_f) ,$$

$$RY_f^a = r(RV_f - RD_f) ,$$

$$CY_f^a = r(CV_f - CD_f) ,$$

$$BY_f^a = r(BV_f - BD_f) ,$$

$$LY_f^a = rLV_f^a , \text{ and}$$

$DY_f^a = rDT_f$ and where the larger of the values enclosed by parentheses is used.

Although it would generally be expected that the imputed return from real estate holdings (RY_f^a) and from money in banks, stock, and so on (LY_f^a) would exceed actual receipts during the year (RT_f and ID_f, respectively), the opposite may occur in some cases. In these cases actual receipts, rather than imputed income, would appear a better measure of the return during the year from these assets. Since a family's total liabilities may exceed the value of its assets, it is possible for $Y_f^a < 0$.

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[1] It may appear, from our example, that under the second approach imputed income need not be added to reported nonearned income. That, however, is not quite accurate. The home owner's annual income, for example, exceeds the home renter's by approximately the amount of rent (less maintenance cost) that he does not have to pay.

The second variant of nonearned income, Y_f^f, is found from the following definition:

$$Y_f^f = HY_f^f + RY_f^f + CY_f^f + ID_f - DY_f^f + TR_f + BY_f^f ,$$

where

$$HY_f^f = (r)(HV_f), \text{ if } HD_f = 0 \text{ and } HY_f^f = (.20)(r)(HV_f), \text{ if } HD_f > 0 ,$$

$$RY_f^f = \frac{RV_f - RD_f}{RV_f} (RT_f) ,$$

$$CY_f^f = (r)(CV_f)\left(\frac{CV_f - CD_f}{CV_f}\right) = (r)(CV_f - CD_f) ,$$

$$DY_f^f = (12)(r)(PY_f) \text{ and}$$

$$BY_f^f = 0$$

Because the reasoning behind some of the calculations involved in computing Y_f^f may not be readily apparent, this will be discussed at some length.

Imputed rental income from home (HY_f^f). If housing and rental markets are operating perfectly, the annual rental value of a house will equal $(r)(HV_f)$, plus an amount sufficient to cover expected maintenance; and HV_f at the time of purchase will equal the down payment on the house, plus the appropriately discounted sum of the monthly payments for which the purchaser is obligated. Let us compare the annual cash income of a renter of a house with that of a family buying the same house and to that of the clear and free owner of the house. The renter must pay out the entire rental value of the house. The buyer, however, must only make his monthly payment and cover any maintenance costs. His income from this particular asset, therefore, exceeds the renter's by r times the amount of the down payment.[1] For the purposes of the calculation of HY_f^f, it is assumed that down payments

[1]The renter, of course, may invest the amount of the down payment in some other asset. Thus, his <u>total</u> nonemployment income <u>may</u> be equal to the home buyer's.

equal 20 percent of HV_f. The only outflow facing the home owner with no mortgage payments is maintenance costs. Thus, his income exceeds the renter's by $(r)(HV_f)$.

Imputed Income from Real Estate Holdings (RY_f^f). Owners of real estate receive a gross addition to their cash incomes equal to RT_f. However, unless the asset is completely paid for, they usually have a contractual obligation to make periodic payments against their debt. Thus, the situation is analogous to a purchase of a home. In this case, however, there do not appear to be any reasonable assumptions that can be made about amounts of down payments. In addition, a family may have several real estate holdings, some of which are wholly owned and others of which are not. To calculate RY_f^f, therefore, it is assumed that net income receipts increase continuously at the same rate as the family's equity in real estate increases, rather than discontinuously at the time RD_f equals zero.[1]

Imputed Rental Income from Vehicles (CY_f^f). The same procedure used to calculate RY_f^f is used to calculate CY_f^f. In this case, however, the SEO file does not provide a direct measure, such as RT_f, of the rental value of the vehicles owned by a family. This value is assumed to equal $(r)(CV_f)$.

Imputed Negative Income from Other Debts (DY_f^f). Respondents to the survey were asked what the size of their payments against DT_f were during the month preceding the survey. Their gross annual cash outflow against DT_f was assumed to equal 12 times their monthly payments $(12)(PY_f)$.[2] Many families, however, may augment their current cash income by constantly incurring more debts of this kind. There is no information on how DT_f changes over time for the families in the sample. I assume that on the average and in the short run it remains approximately constant. Thus, the net outflow of cash income is that part of PY_f applied to interest rather than to principal.

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[1] Strictly speaking, this approach would be accurate only if real estate were purchased in separate parcels that were completely paid for during the calendar year in which they were acquired.

[2] Interestingly, the means of DT_f and $(12)(PY_f)$ are practically equal for the sample.

Imputed Income from Business and/or Farm (BY_f^f). In calculating Y_f^f, it is assumed that $BY_f^f = 0$. Primarily, this is because of the lack of sufficient information to separate the return to a business or farm's physical assets from the return to the owner's human capital. That is, when a man operates his own business, it is unclear where nonearned income (his return to equity) ends, and wages (his return for current physical effort) begins.[1]

[1]Since those who did not report a weekly wage have been excluded from the sample, and this group includes most of the farmers and nonsalaried businessmen who were interviewed during the SEO, the estimates are not very sensitive to the handling of nonearned income from businesses and farms.

Appendix B

ESTIMATES OF PROGRAM IMPACTS USING THE UPPER BOUND PROCEDURE

Table B-1

ESTIMATED AGGREGATE IMPACT OF PROGRAM USING THE UPPER BOUND PROCEDURE AND THE HIGH SUBSTITUTION AND INCOME EFFECT ESTIMATES
(ϵ^S = .30 and C^Y = -.16)

Simulated Program Packages	Number Program Participants (thousands)	Total Subsidy (thousand $)	Total Production Loss (thousand $)	Total Welfare Cost (thousand $)	Hrs. Reduction as a Percent of all Hrs. Worked by Sample Pop.[a]	Production Loss as a Percent of Total Earnings of Sample Pop.[a]
I. FAP-FSP-FSP	100.1	15,842.1	33,323.2	2,467.9	0.44	0.37
FAP+FSP	161.7	216,437.2	176,887.9	33,479.2	2.68	1.95
III. FAP-FSP-SS	469.1	1,230,957.0	942,697.5	222,510.1	12.34	10.41
II. PC	253.1	242,684.6	226,378.6	38,363.5	3.44	2.50
IV. PC-SS	488.6	934,350.0	804,444.5	201,622.2	11.19	8.88

[a]The term "sample" refers to the sample population on which the analysis was based: married males, under 62 years of age, who are heads of New York City households.

Table B-2

ESTIMATED AGGREGATE IMPACT OF PROGRAM USING THE UPPER BOUND PROCEDURE AND THE LOW SUBSTITUTION AND INCOME EFFECT ESTIMATES
(ε^s = .08 and c^y = -.08)

Simulated Program Packages	Number Program Participants (thousands)	Total Subsidy (thousand $)	Total Production Loss (thousand $)	Total Welfare Cost (thousand $)	Hrs. Reduction as a Percent of all Hrs. Worked by Sample Pop.[a]	Production Loss as a Percent of Total Earnings of Sample Pop.[a]
I. FAP-FSP-FSP	144.1	26,061.6	12,039.0	519.6	0.17	0.13
FAP+FSP	108.1	129,398.0	33,868.6	4,145.0	0.53	0.37
III. FAP-FSP-SS	363.6	713,901.1	193,406.8	31,145.5	2.77	2.14
II. PC	178.6	166,157.3	46,447.4	5,136.2	0.71	0.51
IV. PC-SS	351.9	531,045.6	147,898.3	24,336.7	2.23	1.63

[a]The term "sample" population refers to the sample on which the analysis was based: married males, under 62 years of age, who are heads of New York City households.

Table B-3

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT USING THE UPPER BOUND PROCEDURE AND THE HIGH SUBSTITUTION AND INCOME EFFECT ESTIMATES
($c^S = .30$ and $c^Y = -.16$)

Simulated Program Packages	Pre-Program Hours	Hours Reduction					Pre-program Earnings ($)	Production Loss				Welfare Cost ($)	Pre-program Family Income ($)	Net Change in Family Income		
		Mean Hours Reduction	Percent Attributable to:		Percent Change in Hours			Mean Loss in Production ($)	Percent Attributable to:		Percent Production Loss			Total ($)	Percent with Positive Change	Annual Subsidy ($)
			Subs. Effect	Income Effect	Economic	Individual			Subs. Effect	Income Effect						
I. FAP-FSP-FSP	2031	126	82.0	18.0	6.2	6.2	5385	333	82.1	17.9	6.2	25	6227	175	9.9	158
FAP+FSP	1844	475	64.3	35.7	25.7	26.7	4232	1094	64.1	35.9	25.8	207	4531	245	55.8	1338
III. FAP-FSP-SS	2028	753	59.5	40.5	37.1	39.1	5419	2010	59.7	40.3	37.1	474	5963	615	62.2	2624
II. PC	1884	389	68.0	32.0	20.7	21.4	4315	894	67.8	32.2	20.7	152	4866	64	41.4	959
IV. PC-SS	2009	655	64.9	35.1	32.6	34.0	5069	1646	65.6	34.4	32.5	413	5603	2[illegible]	52.6	1912

See notes for Table 15, p. 77.

Table B-4

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT USING THE UPPER BOUND PROCEDURE AND THE LOW SUBSTITUTION AND INCOME EFFECT ESTIMATES
($c^s = .08$ and $c^y = -.08$)

Simulated Program Packages	Pre-Program Hours	Hours Reduction					Pre-program Earnings ($)	Production Loss				Welfare Cost ($)	Pre-program Family Income ($)	Net Change in Family Income		
		Mean Hours Reduction	Percent Attributable to:		Percent Change in Hours			Mean Loss in Production ($)	Percent Attributable to:		Percent Production Loss			Total ($)	Percent with Positive Change	Annual Subsidy ($)
			Subs. Effect	Income Effect	Economic	Individual			Subs. Effect	Income Effect						
I. FAP-FSP-FSP	2012	33	60.4	39.6	1.6	1.7	5066	84	60.2	39.8	1.6	4	5737	97	85.0	181
FAP+FSP	1780	139	41.4	58.6	7.8	8.3	4006	313	41.5	58.5	7.8	38	4301	883	100.0	1197
III. FAP-FSP-SS	2054	218	40.6	59.4	10.6	11.6	5052	532	41.0	59.0	10.5	86	5503	1432	90.4	1963
II. PC	1819	114	43.7	56.3	6.3	6.6	4182	260	44.2	55.8	6.2	29	4628	670	95.5	930
IV. PC-SS	1992	182	44.4	55.6	9.1	9.9	4589	420	44.3	55.7	9.2	69	5123	1089	88.2	1509

See notes for Table 15, p. 77.